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Edward Johnson's
from his brother Wm. Sam. Johnson

THE

VINE-DRESSER'S

THEORETICAL AND PRACTICAL

MANUAL,

OR THE ART OF CULTIVATING

THE VINE;

AND MAKING

WINE, BRANDY, AND VINEGAR.

With descriptions of the Species and Varieties of the Vine; the Climates, Soils, and Sites in which each can be successfully cultivated, with their times of blossoming and bearing; the diseases of the Vine and means of prevention. With instructions for the preservation of Wines, Brandies, Vinegars, Confections, &c. of the Grape; for the care of the Wine-Cellar; the economy of the Vine-Yard; and a brief Sketch of the diseases Incidental to the Vine-Dresser.

BY

THIEBAUT DE BERNEAUD,

Perpetual Secretary of the Linnæan Society of Paris, member of several Societies and Associations for the Improvement of Agriculture; and Editor of the Agricultural Journal of Paris, &c.

From the second French Edition, by the Translator of

LE SOLITAIRE, LE NOTTI ROMANE, &c.

NEW-YORK:

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INTRODUCTION.

It is proper to state here, that in the present translation, and the publication of the same, there has, perhaps, been no motive more powerful with both translator and publisher, than the desire to disseminate the instructions contained in the original work, in accordance with the views and wishes expressed by respectable officers of the Linnæan Society of Paris, through their branch established in this country: one of the maxims of that institution, to which its members liberally assent, being that in their individual capacity they should devote their efforts and influence to encourage the diffusion of the information collected by the Society, especially such as is of practical adaptation, and tends to the improvement of any province of agriculture. And it is now a subject of congratulation to the publisher, that this work will make its appearance at a time when the spirit of enterprise in the Vine-Culture is so forward, and when so many possessed of capital and education, are turning their cares and attention to this new and promising article of produce. He entertains the hope, confiding in the character of the original work & of its author, that this publication will, along with others on the same subject, meet the call for information, and supply the necessary general principles by which this culture should be regulated. The two following introductory and explanatory letters, concerning the ability and merits of the author, are subjoined, in recommendation of the selection of this Manual for these purposes.

The following is a letter written by Dr. Samuel L. Mitchill, in answer to a note to him from the translator, requesting his opinion of Thiebaut de Berneaud's Manual on the Vine.

New-York, Jan. 30, 1829.

"*I do myself the pleasure, as soon as practicable, to answer your letter of yesterday, on the subject of the Vine-Dresser's Manual. It appears to be a regular treatise on the Grape-producing Vine. The subject is treated under the following heads:* 1, *the culture of the Vine and its introduction into France.* 2, *the diseases to which it is subject,*

their causes, and the means of preventing and removing them: 3, the art of making wine: 4, preparation of brandy: 5, different uses of the products of the Vine, in domestic economy: 6, a sketch of the diseases peculiar to the Vine-Dressers.

"You ask my opinion of the author M. Thiebaut de Berneaud. I have no personal acquaintance with him; but have seen a considerable number of his writings and compilations. I consider him, independent of his perpetual secretary-ship to the Linnæan Society of Paris, as holding a respectable and distinguished place among the savans of the present time. His productions contain abundant proofs of his industry and research. He may be fairly classed, I think, among the most zealous cultivators of natural science, more especially botany, and its relations to farming and horticulture. Though not a practical cultivator of the vine myself, I am nevertheless led to conclude that this work of his, possesses a full share of merit. I hope your translation of it into English will invite many readers. The high character of the author will doubtless, at this season of vine-culture, attract much attention.

Added to the preceding publications of able men, at home and abroad, on the same subject, I anticipate from this tract, benefit to the country and reward to the translator."

Yours with sincere esteem and regard,

SAMUEL L. MITCHILL.

Honorary President of the New-York, Branch of the Linnæan Society of Paris.

From Dr. F. Pascalis.

The Vine-Dressers' Manual, Manuel du Vigneron of France, which after having passed through several editions, is now offered in a good translation to the American public, is a work of standard merit, and enjoys much celebrity where its usefulness has been tested; more particularly has it been held in great repute in that northern section of France, where of late the culture and crops of the grape have been more generally attended to than they were in former years and rendered quite domestic. The author, Monsieur Thiebaut de Berneaud, editor of the Paris Journal of Agriculture, and member of many learned societies, has himself been a powerful contributor to the extension of that rich species of culture in climates where it was formerly thought as perfectly inadmissible, as in the Belgic and other provinces of the Low

Countries. At present, however, both the fruit and excellent wine are abundant in those parts, and in countries much beyond the 47th degree of North Latitude.

No cultivator, whether horticulturist or farmer, can read these pages without admitting the practical merit of the clear instructions, and recognising an experienced teacher, whose precepts can be adapted to every climate and latitude in which the grape is found indigenous and sufficiently productive for the important object of fermentation. All the processes of this latter, are also given in the work, with the most lucid and plain detail of circumstances. Monsieur Thiebaut, who has been so long the principal agent and secretary of the Linnæan Society of Paris, and who in that capacity has given such admirable and valuable assistance towards its extensive collection of Annals in Natural History and Philosophy, presented this work long since to the subscriber, inviting him to employ it for the encouragement of the culture of the grape-vine in this country, where that plant is a native, and where it needs but the industry of the inhabitants, and proper modes of cultivation, to insure a complete and general success in the raising of wines. Happy to have in part complied with his desire, and honored by being the depository of his recommendation, I the more confidently presume to subjoin my wishes to his, that we may yet see yearly vintages on this side the Atlantic, as regular as the harvests of grain.

FELIX PASCALIS M. D.

President of the Linnæan Branch of Paris for the U. States of America

New-York, February 10th, 1828.

THE VINE-DRESSER'S

THEORETICAL AND PRACTICAL

MANUAL.

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THE

VINE-DRESSER'S

THEORETICAL & PRACTICAL MANUAL,

&c. &c.

CHAPTER I.

HISTORY OF THE VINE.

The plant that bears the grape is one of those that has been for many centuries under the closest cultivation. It was first disseminated over the earth by the Ethiopic colonies ; from the Ethiopians the Arabians received it, and from the latter it passed into Judea. Then following the coast of the Mediterranean it flourished in Egypt, Syria, the shores of Ionia, Greece, Spain and Italy. The above-stated progression of the vine is drawn from the most authentic circumstantial evidence.

All knowledge of the first application of the vine to its present object is denied us ; of that, as of every useful invention necessary to our actual comforts, we enjoy the benefits, without concerning ourselves about the benefactor. If we must assign some probable period for the discovery, we will place it as far back, as the very first cultivation of the earth by tillage. The vine, in the very birth of society, must have been an object of importance sufficient to fix the attention, and arouse the industry of man. Mythology availed itself of this ignorance of the first adoption of the vine, to give it a miraculous origin, and to form fabulous accounts of the period, circumstances, and uses of the discovery.

We should like to be able to say who it was that introduced it into France, and at what date. But those who have busied themselves with the antiquities of Gaul, can only draw vague conjectures from the contradictory accounts of Greek and Latin writers. According

to Pliny (Hist. Nat. lib. xii. cap. 1.) the first who made known the vine and its juice, and the advantages of its cultivation, was a Helvetian, named Helicon, who having made his fortune at Rome, wished, on leaving Italy, to enrich his own country, and those parts of Gallia he should pass through, with the knowledge of this precious plant. Plutarch and Livy, on the contrary, affirm that it was aTuscan emigrant, who in revenge for his exile and expatriation intoxicated some Gaulish chieftains with the finest Italian wines; and by this temptation engaged them and their armed tribes to undertake the pillage and sack of Rome, and possess themselves of the Peninsula. The opinion of Cicero seems more to the purpose; he thinks the introduction of the Vine due to the interchanges brought about by commerce; a sentiment confirmed by Varro, Strabo and Julius Cæsar. Diodorus of Sicily tells us the same, and that in the most positive manner. Justin is another witness in its favor; he declares that the Phocian colony of Marseilles brought with them to their asylum from tyranny, the Vine, which they had cultivated at home with such signal success.

What or when its origin, at least we are certain that from the first of its appearance in France, the cultivation spread into every disposable corner, wherever a fitting soil and exposure, and active arms and spirits were to be found. Its rapid adoption and progress excited the jealousy of Rome, who, under pretence of preventing the recurrence of famine, decreed that the vine-yards should be turned into wheat fields; and by a second edict, aimed directly at this merciless object, ordered a general grubbing up of the Vine throughout the territories of Gaul. This took place A. D. 92. It was so rigorously executed, that the inhabitants were obliged to resort to metheglin, beer, and fermented drinks, such as had been in use before the introduction of the grape. This inroad on private rights was not committed with impunity. The yeomanry, whose sturdy arms draw from the soil the nourishment of a country, are prompt to resist the tyranny that would grind them to the earth; they are not patient abiders of the yoke and fetter. The ferocious Domitian, who had decreed the extirpation of the Vine, was forewarned of his fate in the following distich; "When thou shalt have gnawed me down to the root, (says the Vine to the goat browsing among her branches) I still shall bear fruit enough for a libation to be poured at the immolation of our Emperor."

I repeat it, the prevention of dearth was only a pretence made uso of to render Gaul entirely tributary to Italy, and to take from her the high reputation she had gained by her wines, which were in request among the most distant nations; for the edict was kept in force for two centuries. It was not until A. D. 282 that Probus restored the

culture to our ancestors. The restoration was one long festival of rejoicings, and every possible display of exultation. Soldiers, old men, women, and children, all united in the delightful labour of regenerating the richest resource of the land. All seemed possessed with a spontaneous eagerness to help in the task of breaking up the soil; grubbing out the decayed, useless stocks; digging trenches, and setting out the hill-sides, once more, with the cherished and long regretted plant. From the testimony of contemporary annalists, it was a festive sight to witness the population of whole villages, swarming forth into the fields, and beating the ground with frolicsome dances, making the air ring with songs and shouts, and in the midst of the frankest merriment, restoring to the glebe, the plant which had been forbidden to decorate it with its grateful shade and rich fertility for so long a revolution of seasons.

From that period, the vine, which had never been cultivated north of the Cevennes, spread along the banks of the Rhone, the Saone, and even to the shores of the Seine, the Marne, the Moselle, the Scheldt and the Rhine; becoming an object to the great land owners as well as to the petty proprietor and cultivator.

The wild and baleful expeditions to the East, in the twelfth and thirteenth centuries, brought us from Cyprus, Alexandria, Corinth and Palestine, grape-vine slips of an excellent species, till then unknown to us. They were planted at the foot of the Pyrennees, and from them we have the wines of Frontignac, Lunel, Rivesaltes, and others.

The Vine continued to extend over every part of France, and threw open a rich department to commerce. But in 1556, a new proscription arrested it. It was said that it drew attention from tillage; and that vineyards encroached on the proportion of ground that should be dedicated to the plough and the reaping-hook. The vines were again torn up, and the hills laid bare of their embowering verdure. Eleven years after the law was revoked; and the Vine was allowed free growth until the beginning of the eighteenth century, when agriculture being depreciated and debased by the heavy taxes and imposts of the times, and the low esteem in which the most useful class of the country was held, all sorts of cultivation languished; the blame of which was laid on the luxuriant and teeming vineyards, lovely with fertility in spite of neglect. A royal decree forbade the setting out of new slips, or the giving the least care to such as had been out of training for two years, under penalty of a fine of $600 (3000 franks.) Far from remedying the evil, it only added to the sum of misery and distress, as is ever the case with proscription, that blindest and most headlong of

measures ; indeed, no interdict ever yet proved wholesome or salutary that was laid on any branch of commerce ; and agriculture, the nurse of traffic, can least be expected to thrive, without a latitude and encouragement being given her, so wide and so thorough, that she has no obstacle or thwart to abide, save those disasters of the seasons of which Providence is the sole judge and giver.

The revolution of 1789, which restored to each owner of the soil the full exercise of his discretion over his own rightful possessions, has put an end for ever to the mischievous system of restraints and restrictions, and taught that private advantage is public interest. Industry is now free to create and continue resources of wealth, without fear of the bugbear of national evil. This liberal system of legislation gives us the power of satisfying the home market for consumption, and producing an adequate supply for exportation ; an advantage of which we can scarcely be again deprived, even should the iniquitous intent enter the conception of some foe to social rights.

CHAPTER II.

The Vine belongs to the natural order, *Sarmentosæ*, a family of plants with stem-like branches. The class is pentandria monogynia; leaves alternate, palmated, five lobed, more or less distinctly incised or dentated: green or blueish; with flowers in clusters, opposite to the leaves, supported by a common peduncle, which turns a to tendril if the blossom fails. The flowers are small, greenish; the calyx very small, whole and five toothed; the corolla is formed of five deciduous petals, sometimes united together at their summits like a crown, and shed without being disunited. The stamens are five in number, opposite to the petals; their filaments subulate (bent like an awl) and supporting simple anthers. No style; stigmata sessile (close set) in a five-chambered ovary. This ovary becomes a round or oval berry, juicy, unilocular when ripe, with five stony seeds, two, three, or four of which are abortive.

The fruit is only borne on the shoots of the year, and generally at the fifth, sixth and seventh joint; so that if the seventh joint has made its appearance without sign of fruit, none need be expected from that shoot.

The species or varieties of the vine are very numerous. Their names must long remain obscure and empirical, in a measure; for the labor of arranging them in some regular nomenclature is greater than can be imagined; it can only be accomplished by the concurrence of agricultural societies. It has been attempted for the vineyard of Arbois (Jura) by Dumont, corresponding member of the Linnæan Society of Paris; and in Spain for the Vines of Andalusia, by a distinguished and learned naturalist, Dn. Simon Rojas Clemente; their works only convince us how long we must be condemned to wait for the completion of this interesting portion of the history of the Vine. The same names are attached frequently to distinct varieties; and often, the one variety is so altered or detoriated by different modes of cultivation, soil and exposures, that it cannot be known by the name. To obtain a clear summary of these varieties some certain rules or

designations should be chosen, and the value of the characteristics taken to calculate upon, should be fixed and established.

The roots are partly penetrating, partly running, and thickly fringed with capillary threads. The stem is cylindrical, thin in proportion to its length, and requires support. When young, the stem is more or less strongly divided and marked by joints or bends. A single plant of the vine is sometimes termed a *slip*, sometimes a *stock* ; the latter name is more particularly given to that part of the vine which answers to the *trunk* in trees ; in the wild state, there is no certain rate of length or thickness, both seeming to depend on accident ; but they are regulated by the vine-dresser, according to his mode of cultivation. The *stock* when young, is covered with a green or tawny bark, which becomes brown with age ; it is uneven in thickness, and irregular in adherence to the wood ; most frequently seamed and split lengthwise, and loosened from the wood in long, narrow layers or overlapping parcels, which are in the end entirely started and swept away by the wind and rain. In cold countries the bark is more compact, and more even.

From the *stock* or trunk, spring the *shoots* or branches, stem-like, sometimes forked, smooth ; of a reddish grey in the woody fibre, and green in the herbaceous portion ; their number very various, and the length indeterminate, only, that those growing upward, are shorter than the lateral shoots which run horizontally ; and these again are shorter than the lowermost, which trail on the ground. The thickness is generally proportionate to that of the stock or trunk. In the shoots of the season, or yearling branches, the pith fills the whole ring of the woody part ; the next year the wood is thicker and the pith less ; the third year, there is only a trace of pith, and in the fourth year the wood is solid.

The short twigs springing from the principal branches, are termed *secondaries* or *second-shoots ;* if the sap be poor and scanty, there will be, on the shoots, many buds or beads which perhaps do not unfold at all ; but if the juices of the plants are plentiful and vigorous, the sap swells and drives all these buds into *second-shoots* of considerable length, which bear fruit as well as the shoots proper. Young vines, and those that have been topped by any accident, are liable to bear a great many of these second-shoots.

On the shoot we find the *leaves*, the *fruit*, in bunches opposite the leaves, and the *tendrils* by which it clings to other objects to support itself. Sometimes the shoot terminates in a small bunch, the berries of which are small, crowded, and generally round.

The leaves are mostly largest nearest the stock, and diminish in

size towards the extremity of the shoot. The more the leaves are sharply lobed, the less they preserve the orbicular figure. The ribs are very large and distinct, and sometimes have the same tawny or reddish tinge as the leaf-stalk. The tendrils or *cirrhi* are a filamentous growth, an elongation of vessels of the shoot. They are rarely stationed at random, but generally opposite to the leaf; they are branched or forked according to the strength of the species, the nature of the stock, or the vegetative powers of the shoot. They may be converted into fruits-talks by the following simple operation. When branched or forked, the smallest or weakest prong must be nipped off closely and neatly; three or four days after, on the prong that is left, small buds will make their appearance, which increase and produce well-formed bunches, and mature into excellent grapes. This experiment was made for the first time in 1817, by M. Ristelhuber of Strasburg, and has been repeated by a great number of gardeners and vinedressers, and always with perfect success.

The *berry* is round or oval, varies in size and hue, being lighter or darker, of a blackish purple, foxy red or green, white or golden yellow. The colour is principally confined to the skin, which is thin, leathery or coriaceous; the pulp and the juice are very colourless, even in black grapes. The delicate bloom which coats the berry when ripe, is a symptom of maturity worthy of strict notice, according to Garidel and Estevan Boutelon. Each berry is attached to a fruit-stem or foot-stalk, which springs from the main peduncle or stem of the bunch; the assemblage of main and minor stems and berries, constitutes the bunch.

The aroma of the Vine when in flower is highly prized in the East, and thought to possess incredible virtues. It has a very volatile and penetrating fragrance.

These general characteristics of the Vine, are such as are least known to vary or admit of change; they are therefore taken as fixed points, on which to append our descriptions of the several sorts and varieties that are found the most profitable for cultivation.

1. EARLY BLACK MORILLON

Morillon Noir Hatif.

Of this grape three are two kinds; the one is indigenous and is generally called the *Magdalen grape*; the other is exotic, and the cultivation of it has only of late years attracted attention. It is known by the appellation of the *Ischian* or *thrice bearing vine*.

The Magdalen kind is, according to some, a native of Italy; it has a lower, shorter stock than most other kinds; the leaves are small, and also the bunches, which are very compact; the berry is not large, and is roundish; the skin leathery, of a black purple, with a high bloom; the pulp greenish, slightly sugared, and almost insipid. It ripens by the end of July, or at farthest by the beginning of August, which is its only advantage. It figures on the tables of such as pride themselves on early fruit, and has no other merit than that of flattering the pride of a fantastical taste. It requires a loose, red soil, exposed to the south. It has erroneously been asserted to bear three crops in a favourable season, by the aid of judicious pruning; but the thing is impossible. The kind to which Virgil alludes, (Geor. II.) and which Pliny, (Hist. Nat.) calls *trifera*, thrice-bearing, *insana*, mad vine, is successfully cultivated by M. Borghers, of Lumigny, (Seine and Marne;) and since 1812, he has distributed a great number of scions and cuttings. This kind is very vigorous, and yields, from the fourth year of its setting out, an abundance of excellent grapes, provided it be not pruned too close, and lopped too short. Owing to its great vigour and tendency to luxuriance, it is necessary to allow, after the second pruning, a considerable length to the wood or stock. When this vine has attained its fourth year, the first crop, which is the largest, ripens in the 48th parallel of latitude, in a southern exposure, from the 15th to the 20th of August; the second crop ripens from the 25th September to the 5th October; and the third, which is merely a demonstration, from the 25th October to the 10th November, if not caught by the early frosts. The two latter crops are the result of pruning; the end of a shoot is cut off, two or three joints beyond the last bunch, just as the blossom has fallen, and the berry is moulded; that is, from the 15th to the 20th of June. New branches or second-shoots immediately spring from the joints that are left, and unfold the clusters of the second crop; as soon as the blossom of this latter is shed, the previous operation of pruning is repeated on these second shoots; and soon after, but less rapidly than upon the first operation, the third crop appears, which it were better never to prune for in high latitudes, as it is very scanty and seldom succeeds to reach maturity.

This plant requires a soft soil essentially light, and rich in vegetable mould. During drought it should be at times watered. A southern exposure and espalier training are rigorously indispensable to obtain the three crops in the northern departments of France.

It seems that it is a native of the isle of Chios, whence it was carried to Calabria and the island of Ischia, where it is called *Uva di tre volte l'anno*. The berry is very sweet, of a highly agreeable flavour,

and with all the qualities requisite for furnishing a very fine wine. We would invite the attention of cultivators of the Vine to this species, recommending a trial of it in situations where it is difficult to ripen the grape. If the wine itself should not be even equal to beer. or cider, the grape itself would be one resource the more at harvest time, and for the tables of the poor.

Many writers have confounded this fine variety with the preceding, to which it has no points in common, save color and early ripening. To prove the error, I shall state the following facts.

Under the same tilling, training and pruning as the Ischian grape, the Magdalen grape for several successive years, gave always an early yield, but only the single crop the season; while the Ischian gave three crops in 1822, and only two perfectly ripe in 1823—24, which were unfavourable seasons. In 1825 the vine exceeded all expectation: slips trained in espalier gave an abundant crop, full ripe, the 18th August; the 20th September, the splendid second growth was dead ripe, and the fruit fuller and larger than the first; while at the same period, the berries of the third crop had filled and were beginning to turn, and the fourth crop was in blossom. The latter ripened on the 30th October; it was very abundant, tolerably handsome, and slightly acidulous; and the berries were of the size of small peas.

This vine, cultivated in the open field, with its branches wound around strong posts, four feet in height, produced in 1825, on the 10th September, a first crop which was in every view magnificent; and the 30th October a second crop perfectly ripe, and quite abundant; but the bunches were small.

2. THE MILLER'S GRAPE.

The Miller's grape is the earliest to ripen of any; it is easily known from all the other varieties, by the greyness of the leaves, which, especially in the spring, are covered with a thick, silky, whitish down. It will thrive in a very meagre soil, and is not tender to the frost; but if nipped, it does not renew the blossom that season. The bunches are thick and short; the berries rather crowded, round, large, of a very pale yellow, and a sweet, agreeable flavour The wine is passably good. This grape is very generally cultivated in all vine-yards, and has one advantage attending it, that it is not subject to the Blight, or barrenness of the blossom.

3. THE BLACK BURGUNDY.

Le Bourguignon noir.

The sort generally known by this name, is sometimes called *franc Pineau, Farinau, Noirier, Auvernas.* The leaf is coated with a cotton-like down, is blunt at the summit and but slightly lobed. The woody-fibre, the leafstalks and even the stems of the bunches are of a deep, dark-red hue. The bunch is not over thick, is blunt-shaped and not very compact; the berries oval, of a high coloured claret, and ripening uniformly. It is but a poor table fruit, but is highly prized for wine; and indeed is the staple kind for that object in France. It requires a light, sandy or siliceous soil, and an eastern or western exposure. It stands the frost very well. The wine is rich, keeps well, and has an agreeable bouquet. The only draw back of this sort, is, that it is not a thrifty bearer; the crops are small, and frequently, are only yielded every other year.

4. THE TINTO GRAPE.

Le Teinturier.

The wood and stems of this kind, are redder even than the preceding variety. It is sometimes called *Large Gamet*, Noireau, (Oliver de Serres says *Nigrier*) *Large Black*, or *Spanish Black.* Its leaves are very remarkable by their high tinge of red. The bunch is short; the berries crowded; and of a dark crimson colour, middling large, and very juicy. They are used to colour the must of other sorts; the wine made from them alone, without the addition of other grapes, is flat, harsh and ill-flavoured; but can be rendered more lively by the admixture of the juice of the common white grape. Spring frosts are very severe upon it. It seems easily suited in soils and exposures. The grape is unfit for the table, being sourish, harsh and hard.

5. SMALL GAMET.

Le petit Gamet.

This variety of the Black Morillon thrives best in a strong loam, and any exposure will agree with it, though a northern one is the best.

The leaves are pointed, divided into three distinct lobes, of a pale green. Late spring frosts affect it; but when nipped, it sends out a second crop of blossoms. The grape matures easily, and makes a passably good red wine. It bears well; but the stock requires frequent renewing by layering, as it does not last many years.

6. PEARL GRAPE.

Le Raisin perle.

The leaves are dentated, lobed, of a bright green; the bunches loose, the fruit-stems very green; the berries of quite unequal sizes, but mostly not large; oval, of a pale pearly green, and full of a rich, sugared juice. This variety is the staple of a great proportion of the vineyards. It likes a substantial loam, calcarious or marly, with a declivity to the ground. Humidity is most injurious to it during the blossoming; spring and fall frosts are both highly prejudiciable to it; if once nipped, it does not bear again until the second year after. The grape when full ripe is slightly musky, and the wine it makes, whether white, pale, or red, is generous and excellent. The marmalade too is very rich and fragrant. This variety does not require frequent layering; and when under the pruning knife, the cutting should be made on intermediary shoots, and those not the strongest ones, which, according to their strength, are allowed one or two large doublings or bends, without any fear of their running out to a too great length.

7. BLUE GIRKIN.

Cornichon violet.

The leaves are very large and but slightly scolloped or lobed; the bunches are small and scantily filled; the grapes long, largest at the base and rather curved or hooked at the apex, like young cucumbers. The proportion of their length to their breadth is as 2½ or 3½ to 1. When ripe they are sometimes entirely blue; but they oftener remain green at one end, which is generally the largest. This is the case in the neighbourhood of Paris where it is hard to find the Blue Girkin perfectly ripe. There is a white variety of the same fruit which matures more easily. The wine of this sort is hard, and requires to be sweetened by a mixture of milder grapes. It thrives in a strong soil, well open to the south.

8. WHITE GRISET.

Le Griset blanc.

The leaf has a lively light green hue and is so slightly lobed, that at first view it appears entire. The bunch is small, of very irregular form, and composed of round berries, crowded together, greyish green in colour, palatably sweet and of a highly agreable aromatic flavour. The white wine made from it is highly esteemed, and is reckoned the third best in France; it is very alcoholic and must be drunk in moderation; it has much body, is mellow, clear, and the bouquet very sensible. The White Griset requires a gravelly soil, situated aslope and exposed to the heat.

9. WHITE MORILLON.

Le Morillon blanc.

The White Morillon or Beaunier, has a large leaf, which is of a fine lively green on the upper surface, white and cloth-like on the lower; and the five lobes are separated by shallow, irregular scollops. The bunches are rather long and composed of distinct clusters; the berries are not very thick set, roundish, and middling sized; of a whitish green, mottled with white and pale yellow; the pulp soft and sugary. The fruit ripens easily: is fine for the table and for wine. It thrives best on a clayey slope of ground, inclining to the west or the south. When pruned, the pollard-stems are generally left long enough to take a large bend. The wine keeps well; and the grapes may be kept fresh through the season.

10. WHITE MORNAIN.

Le Mornain blanc.

The White Mornain greatly resembles the White Chasselas in the bulk and shape of the bunch and the set of the berries, which are not crowded, are very round and of a pale yellow colour. They become tanned on the sunny side in the same manner; the must is sweet and well tasted; the frut ripens easily even in the north. This kind is

known in some Vineyards under the names of White, Green and Black Melier. The White Melier is preferable to the Black or Green though the latter is a great bearer, but slightly ever subject to the Blight of the blossom, and never takes the Yellows. It is found very profitable to plant it along with white vines.

11. THE MUSCAT.

Le Muscat.

The Muscat is generally preferred as a table-grape; very little wine is made of it, even at Rivesaltes, (Eastern Pyrennees,) at Frontignan and Lunel, (Herault.) The grapes are round, firm, and very large; mostly very much crowded on the cluster, and of a very pleasant musky flavour There are White, Red, Black, and Blue varieties.

The overgrown bunch of the White Muscat is very long, narrow and round at the point. The grapes are so thick set, that they require to be thinned to ripen well. They are firm, and brittle under the teeth; and are of a light green colour, amber-yellow on the sunny side. The pulp is white, with a blue eye, and a strong flavour of musk. It does not ripen easily as far north as the environs of Paris. The wine made from it has much body, and a decided taste of the fruit, with a most fragrant bouquet; and it gains by age.

The Red Muscat has a less crowded cluster, and shorter bunch; the quite globular berry takes a bricky hue, or a pale mottle, where shaded; the sunny side is blue or purple.

The Black Muscat is known by the slender cluster, loosely studded with berries, which are very round, smaller and less musky than the preceding; the skin black, downy, or of a black purple. The pulp is red next the skin. This grape ripens easily, and by some, is highly esteemed.

The Alexandrian Muscat, has the leaf smaller and more indented than the other varieties. The clusters are very bulky and full of long, large, oval berries, about an inch in length, of a light green, slightly ambered or gilt, firm, brittle to the teeth, and of a musky, agreeable savour. The berries have often but one stone, sometimes none. The fruit keeps a long while; and rarely ripens as far north as Paris. It should be planted in a strong mould, with an exposure to the south.

12. THE CHASSELAS.

Le Chasselas.

This is an excellent grape, fine for the table; and is the one usually chosen for arbours, trellises and palissades in gardens. It ripens well under such training, and will keep from the end of September or beginning of October, during all the fall and winter, even till the month of May. The bunches are generally large, long, loose, and formed of several clusters at top; the berries are white, round, firm and of a size often varying on the same cluster; on the sunny side they have a fine amber colour. The pulp is very melting, pale green in colour, and full of a bland sweet juice; the skin, though very delicate, is firm.

The White Chasselas is the most common. There is a black variety, that is to say, the grapes, as soon as they fill, take a black or dirty red tinge on their white ground. It is a rich fruit, and by some preferred to the White Chasselas, but it ripens later. There is also another Chasselas, with musky fruit, *The Musk Chasselas*, the flavour of which is even more exquisite and more remarkable than either of the two others. The berries are thicker on the bunch than in the white Chasselas; and are equally round, but more pulpy; the colour yellowish white. It ripens early where the exposure is warm.

13. CIOUTAT, OR PARSLEY-LEAVED.

Le Cioutat.

Though this is generally looked upon as a simple variety of the common Chasselas, it differs from it greatly. This sort has small leaves, very much lobed, divided and laciniate; the bunches small and but thinly furnished; the berry small and soft. I ought to add that it differs also in every essential, being a grape of a decidedly inferior quality. It is sometimes called Austrian or Tardaria grape.

14. THE CORINTH.

Le Corinthe.

We have four kinds that go by this name, the White, Blue, Red and Large Corinth. The White, which is most prized, has a large slightly

laciniate leaf, of a clothy texture, deep green on the upper side, and covered on the under side with a white down. The cluster is middling thick, short, crowded and thick set with very small round berries. They ripen in September, are white, with a slight tinge of yellow; and the white pulp is very sugary, melting, and extremely agreeable to the taste. The grape contains no stones; and the rind is so tender that it is eaten with the fruit.

The Blue Corinth is larger than the White and has also no stones, but is very apt to bleed. The grape rots so rapidly that in the South-eastern Departments it has taken the name of *Passe* or *Passerille*. It requires in pruning, to be left longer than other Vines. The Red Corinth is much liked; the Large Corinth seems only a variety of the White Chasselas with a smaller, and less sweet berry.

15. ALEPPO GRAPE.

Le Raisin D'Alep.

This kind of grape was brought to France during the Crusades; and is now completely naturalized. The leaves are dark green and distinctly lobed; they become spotted with red and yellow in the fall. The berries are rather large, and round or oval; some white, others black, or marbled, or presenting stripes of the two colours on the same bunch. They have but one stone; and are easy to ripen. As this grape is very subject to the Blight, care is taken in pruning to leave the shoots long. This stock is a good bearer and durable, but slow of growth; the wine is good, keeps well, and strengthens all wines with which it is mixed; making them fiery, and helping to preserve them.

16. THE GOUAIS.

Le Gouais.

Two kinds of grape bear the name of Gouais or Gouest; one is a white grape, vulgarly called *Verdin blanc*, *Marmot*, and *Mouillet*; the other blue, called *Gros plant* or *Plant de Vigneron*, *Complant de lune*, *Gros Tressant*; both are excellent for wine. The cluster is very large, thick and long; the berries either roundish, or oblong; moist, yielding, more green than yellow, rather tasteless and insipid, but almost the whole berry dissolves to clear juice. This abundance of

must has lead to the preference of the Gouais for wine, wherever quantity is more an object than quality. Vineyards once set out with it, last a long time, especially if the White Gouais is the principal variety used. It likes a loose, open, light, warm soil. The leaf is heart shaped, the lobes but slightly marked; both leaves and bark of the shoots have a reddish brown tinge.

17. THE VERJUICE GRAPE.

Le Verjus.

It is known also by the name of *Bordelais*; the Verjuice grape has a large stout leaf, slightly divided. The bunch is generally thick, long, and at the top several secondary bunches or clusters are grouped together, making of the whole an enormous-looking production. The berries are middling close, oblong, pointed, of a pale green colour, assuming a slight degree of yellow when ripe. The skin is thick, the pulp firm, of a greenish white, very harsh-tasted at first, but becoming passably mild towards the middle of October. This grape, which is not fit for eating unless prepared, is excellent in conserves, marmalades, and other confections; and is very suitable for the making of Verjuice.

There are three varieties of it, the White, Black and Red. The two latter are not in as much regard as the former. They may be grafted on any stock; they succeed perfectly on those the stock of which is apt to bleed, such as the Blue Corinth, the Alexandrian Muscat, &c. The coolest exposure suits them best.

18. OF OTHER SPECIES & VARIETIES.

If I were called upon to give here the nomenclature of all the species, races, and varieties of the Vine that appear and pass away during the course of years,and to which this or that canton or vineyard is peculiarly attached, I should only run the risk of repeatedly presenting the same plant in the disguise of a new barbarous name, and of falling into useless details and indifferent digressions. I have found many names in the books of the last century alone, of which it would be difficult now to find a single one in use. And now, under the single name of *Pinot* or *Pineau* almost every red grape may be found so classed by the Vintagers, without any one being able to answer whether this name, which only suits such sorts as have berries shaped like the pine-cone, is given by them to the kind to which this name

belongs, and which is cultivated in the Departments of the Yonne, Cote-d'Or, Saone and Loire; or to that grape which yields the small wines of Vosges and the flat wines of Haute-Vienne.

Distinctions of the varieties of the Vine must be always obscure and empirical, since there are as yet, no universal points of agreement on the real value of the expressions and characters by which they are designated. And nothing, not even a whole life dedicated to it, would be as powerful in extricating the history of the Vine from the labyrinth of confused names, as the communication of special committees of every agricultural society, discussing individual researches, and reducing them all under a uniform nomenclature. Columella, the wisest and best of Latin natural philosophers, who signalized 58 varieties of the vine*; Crescenzio, the restorer of Italian agriculture, who tells of 40, peculiar to the Peninsula, in the third century†; Alonzo de Herrera, who recognized 15 essential differences in the Vines of Spain‡; Duhamel du Monceau, who has given so exact a description of 14 varieties deemed by him peculiar to France§, furnish fine materials; their treatises form excellent starting points for the undertaking just indicated.

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* De Re rustica, lib. III. cap. 2.
† Opus ruralium commodorum, lib. IV. cap. 3 and 4.
‡ Agricultura generalis, lib. II. cap. 2.
§ Traite des arbres fruitiers, Art. Vigne.

CHAPTER II.

OF THE SOILS AND EXPOSURES SUITABLE TO THE GRAPE.

When we cast a glance at the extreme indigence of the great proportion of the labouring class of the vineyards, we are at first induced to blame the Vine as an unprofitable concern; but on looking a little more narrowly to the causes of this want and indigence, we discover the true reasons. In the first place a heavy impost is levied on the Vine and also on its liquor; and so arbitrarily laid, that the least productive Vines pay often as much, and even more, than the best; while the quality of the wine which gives it its value, does not enter into the stipulations of the tax. The other causes are, erroneous modes of cultivation; such as not taking into calculation the nature of the soil, the proper exposure, nor the outlays of labour and expense first requisite; or not choosing the stock with judgement; or neglecting the tillage, pruning, training or other operations necessary for the perfection of the crop.

High imposts discourage the landed proprietor; however, the remedy is easily at hand, in the lessening of these burthens; but wrong systems, or negligent processes of cultivation are equally an injury to the state and to individuals; and both cases duly remedied, this culture would be the richest of any. If only proper agricultural cares are resorted to, the returns are ample ones; as every acre, judiciously set out, tilled and trained, will yield a nett profit of from 5 to 600 francs (from one to one hundred and twenty dollars.)

The first point to be considered, after the climate is ascertained to be suitable, is a knowledge of the soil; all climates are not favourable to the crop; the Vine, in the North, spends itself in a vigorous vegetation, but the grape will not ripen sufficiently; in the South it has to encounter a long-continued withering heat; and the qualities of the fruit essentially degenerate when the plant is watered. The climate therefore should be one of a temperate character; the Vine does not prosper except between the 35th and 51st degrees of latitude. Schiraz, a large and populous city of Persia, situated at the

foot of the mountains of Feristan, is thought to be the most southern position in which it thrives; and Coblentz, at the confluence of the Rhine and the Moselle, the most northern at which it yields in the open ground. It is cultivated to the best advantage between the two points of limit mentioned, between which lie the finest vineyards in Europe; such as those of Portugal, Spain, France, Italy, Germany, Styria, Carinthia, Hungary, Transylvania, and a part of Greece. In cold countries, by means of vineries, localities may be contrived that will force the Vine, giving it in summer the degree of heat it receives in climates naturally adapted to it. These shelters are so managed as to refract the solar rays in proportion to their directness. The exposure to the sun has so all-powerful an influence on vegetation, that it should not be overlooked by the Vine-dresser. A northern exposure is generally deemed the least suitable; and an eastern one would be the best, if it did not expose the plants, in the first early warm days of spring, to the Blast, from the burning of the sun upon the small icicles which act as lenses. A southern exposure is in general too hot in the summer; and a western one has least to recommend it, as it throws upon the plant a direct heat, after the early hours of the day have abstracted its moisture; and thereby dries and burns it. As a general rule in southern regions, an eastern exposure should be preferred; in northern ones, the Vineyards should face the South.

Sometimes this rule has its exceptions, owing no doubt to the face of the country influencing the courses of winds; as for instance, the splendid Vine-grounds of the *Marne* and the *Hills of Rheims;* those which supply the rich tuns of *Jouy*, (Indre et Loire,); those of both banks of the *Cher;* of *Saumur;* of *Angers;* &c. are, in general, open to the northeast, and the greater number face due North. They are less subject to the disastrous attacks of late frosts in the spring; and their wines are good, with a delicate and perfumed flavour.

The Vine can be suited by a variety of soils; but never with any that are soaked with stagnant or decomposing waters. The kind it prefers is a dry, light, sandy soil. The vine dressers of the department of Arriege (at the foot of the Pyrennees) cultivate it half way up their highest mountains, in spots quite covered with large smooth stones; and if they were a little more careful in their manner of making the wine, more choice in their selection of stocks, and more attentive to tillage and training, they might make their wines equal to those of Tokay, which are also the growth of Vineyards covered with large calcarious pebbles, and lying on the highest flanks and ridges of a

promontory exposed to the North and West at the confluence of the Bodrog and Thibisk. There are fat soils, entirely clear of pebbles or gravel stones, which can be made to yield very good wine ; such as the home-made wines of *Bellai*, in the department of Maine and Loire, which are generous, strong, finely flavoured, and preferable to those from the stony knolls in the same department. But notwithstanding this, fat soils and rich loams are not a proper choice ; experience has taught us, that the excellence of the wine does not depend on the luxuriance of the plant ; and that dry, light earths should be reserved for it.

Calcarious earths, especially those of a chalky formation, give a magnificent crop to the Vine, and the wines are very pure, light and inviting. Such are the Vineyards of the *Marne*, the *Cher*, the *Creuse* ; those of the *Grouets*, (Loire and Charente.) The growth is very slow, it is true, but once well rooted, the advantage is found in the long run. The more dry, arid, light, and unfit for other crops is the calcarious soil, the better it turns out for the Vine. The water with which it becomes impregnated at intervals, circulates and penetrates freely through the stratum ; the innumerable ramifications of the roots imbibe it at every pore ; the culture is easy, so thrifly is every stock ; and the wine produced is lively.

Earths composed of mouldering granite, the disintegrated parts of which are nearly reduced into a friable sand, furnish wines fine coloured, full of zest, and spirit, and of an aromatic flavour, very agreeable. Such are the Vineyards of *Mans*, *Beaune*, *Reaucoulle ;* of *Muret* and *Bessas** (township of Tain, department de la Drome ;) of *Cote-Rotie* (department du Rhone,) of *Moulin-a-Vent*, (township of Romaneche, department of Saone and Loire) ; those of *Rochemaure*, department of Ardeche ; and those of the shores of the Rhine.

Strong, stiff, or clayey loams are not at all fitted for the Vine ; they do not allow the roots to spread and ramify sufficiently ; besides which, the constancy with which the layers of this compact earth are saturated with wet, and retain moisture, keeps up, around the roots, a permanent humidity, which rots their fibre, and is soon fatal to the slip.

Volcanic grounds, and soils of mouldering tufo and basalt, are famous for delicious wines ; they offer an intimate mixture of every earthy principle ; and their semi-vitrified particles, decomposed by the combined action of the air and water, afford all the essentials of a brill-

* More generally known by the name of Hermitage wine ; *Vin de l'Hermitage.*

ıant vegetation to the plant ; and communicate to its liquor a portion of the fire by which the soil has been permeated and impregnated. The best stocks of Italy are those which are planted among the ruins of volcanoes. The crop of wine from the extinct volcano at the foot of which the town of *Agde* is built, is one of the richest in the South of France.

Thus, all light earths, whatever be their colour, that are porous, fine and friable in their composition, and in which water does not abide or collect, either on the surface or below, are such as are suitable for the plant, and requisite for the quality of the wine.

The knowledge of the soil being acquired, the next question will be, the situation that should be selected. Some writers have recommended high grounds for the Vine. *Bacchus amat colles :* says the Latin proverb, to which they so strictly adhere, that they even declare that the elaboration of the sap cannot be complete, unless upon acclivities or flanks of hills ; and that good wine cannot be raised on plains! And yet, in the face of this, what excellent Vineyards are there not in plains! Medoc, (department de la Gironde) is wholly a champaign country ; and there we know, are situated the enclosures of *Lafitte*, *Chateau Margoux*, *Leoville*, *Larose*, *Branc-Mouton* &c. the wines of which are pure, very high, smooth, velvetty, full of force and fire, with a flavour like the odour of the violet or the raspberry. The Vines of Saint-Denis and Sandillon, (department du Loiret,) and those which give the best Orleans wines, are the growth of plains. The well-known Vineyards of *Tonnerre*, *Chablis*, (department de L' Yonne,) *Banks of the Rhone*, and mostly all those which yield the wines known in commerce by the name of *Vins de Languedoc fins*, are situated on plains also.

Meanwhile I should not forget to say, that in warm countries the Vine of course, thrives in elevated situations. Abyssinia, Mount Lebanon, the highest table lands of Mexico; the up-country in the Carolinas ; and the Cordillera over which passes the route from Buenos Ayres to St. Jago de Chili, bear witness to the fact. The Vine meets there with a temperature equivalent to the mildest regions.

Rising grounds are as good as any situation, if they ascend by a gradual slope and are not surrounded by dense woodlands. The summits of hills or ridges, are, on the whole, unfavorable ; they lie open to every change of the atmosphere, and every movement of the air is felt upon them ; which the Vine cannot bear, as it becomes worn and stunted if swept by winds. The fogs too that collect there are very injurious ; and there is no shelter on them from white frosts,

which are very fatal. The ground lying in swales, or at the base of rising grounds, has also its inconveniences; the soil is naturally continually saturated with humidity; and the air is loaded with damp. The skirts of hills when not too sudden in descent, and slopes gradually swelling from a plain, are the true positions for the Vine.

Good stocks are rarely to be found in narrow vales, ravines, or dells, through which a stream of water flows, on account of the winds and currents of cold air daily prevalent in such places; and the fog-damp and mists incessantly maintained by the evaporation. But we must not, from this fact, conclude that no good Vine can be raised beside running water; as some agriculturists believe. A stream adjacent is dangerous only, when the slopes that verge to it are not open and free to the solar action. The wines of the Rhone, Gironde and Marne witness to this fact.

The direct action of the sun is one essential. It is this powerful agency alone, that can mature the high qualities of the grape; every tree therefore that may interpose a shade and exhaust the soil should be cleared away. In some places, where frosts are apt to fall upon the Vines, a custom prevails of planting the Vineyards with trees, such as the peach, apple, olive, nut, cherry, &c. which is wrong, though we may mention by the way the year 1797, in which every stock in the departments of L' Yonne and Cote-d'Or, that was not sheltered by trees, was frozen. The principle, notwithstanding this anomaly, is rigorously exact; if we are anxious that the grape should attain its full ripeness and saccharine properties, on which its value and utility depend. Large plants deduct both light and heat from the Vine; the least hurtful are the peach, almond and olive trees.

It sometimes happens in very superior vine-grounds, that in some of the most suitable situations for the Vine, there are spots where wines of a very poor quality are gathered close beside those of the best. Such, for instance, is the small Vineyard of *Mont Rachet*, (dept. Cote d'Or;) it is distinguished by three divisions, separated from each other only by a narrow path, and termed, Canton de l'Aine, Canton-Chevalier, Canton-Batard. Though the exposure of all is entirely the same; though the nature of the soil, at least, as for the layers next to the surface, is also the same in all; and that the stocks, all of the same species, receive the same tillage and culture; and the grapes are subjected to the same processes of fabrication; still it is an undeniable fact, that the wine of Mont Rachet-Aine, possesses every requisite of a finished wine; having body, much spirit and heighth, a very pleasant nutty taste, and especially a fine zest and a

bouquet, the strength and sweetness of which distinguish it above every wine of that department; while that of the Rachet-Chevalier does not posses those qualities in the same degree; and scarce any of them are found in the Rachet-Batard. This difference is owing, of course, to the nature or position of the inferior strata or beds of the soil; or, to tell the truth, it would be hard to assign the right cause. But for my own part, I am persuaded that it results from the lower layers, over which the tillage has no effect; for the utensils we use cannot be exerted to a greater depth than 3 feet, without a considerable expense, that may be useless, and in most cases beyond the means of the Vine-dresser. In such cases it must be that the stratum of cultivable soil is but shallow, with some rock or bed of clay beneath it, impermeable to the roots. It might be of service therefore to pierce from space to space deep holes with an auger, to give the tap and running roots convenient entrances into which they might insinuate themselves, to seek in the heats of summer and times of drought for the proper degree of moisture, requisite for the thriving of the plant.

CHAPTER IV.

THE CULTURE OF THE VINE.

The greater number of those who have written on the Vine, have contented themselves with simply describing the culture in use in their own quarters; and from that deduced principles and methods, which they want to see applied as general rules for all vineyards. There are, indeed, general principles which may be applied in all cases; but every soil and every position, we may even say, every corner of the same *hectare*, demands some difference in the planting, tillage, or manuring, with regard to the ground, its direction, nature, bottom, exposure, and a crowd of accidental circumstances. The proprietor soon learns to calculate these chances and apply regular rules to them; and it is his province to discern between those which may prove useful and those which are defective.

But there is one great question to be resolved on the mode of culture: it is one of importance, as the ripening of the grape depends upon it; it is on the height to which the stock should be trained. Some prefer that it should be kept tall, and spiry; others low and running. To ascertain which is right, we must examine without prejudice, well appreciating the real motives of both parties; after which I shall give the result of my own observation, supported by the experience of several proprietors, men of sense and instruction.

Of the tall-stock, or running Vine.

The mode of cultivating the vine by festooning and supporting it on trees and palissades comes to us from the ancient Romans; it is still peculiar to Upper Italy; and to the departments of Isere, Drome, Alpes, Basses Pyrennes, Bas-Rhin, Charente-Inferieure, and Arriege, which received it from the first Roman Colonies. The manner is this; either one or two vine slips are set out near a mulberry, cherry, elm or maple; if only one, it entwines its long stems among

the boughs of the tree; and, together, they form a close shrubby coppice; the grapes, hidden under the thick mass of leaves, are generally green, and uninviting in taste, because deprived of the action of the sun; the wine made from them is thin, poor and acerb, wanting both sugar and spirit. When there are two slips, they rise together to the fork, and then are divided and led off to neighbouring trees in opposite directions.* This fashion is better than the former for ripening the grape; and the intermediary ground is devoted to grain or pulse. This method is very pleasing to the eye, but is rarely practised with intelligence and discrimination. The trees are ordinarily too close and cast too much shade. There is, besides, some danger attending the culture; among the Romans there was an express stipulation always made between the proprietors and vine-dressers, that if the latter, in pruning, should fall and lose their lives, the former should be at the expense of the burial. Besides, the grapes on the very summit of the tree are the only ones that make good wine; the lower branches are more loaded with clusters, but the wine, though abundant, is coarse.

There are some parts where, in place of trees, they make use of tall props 8 or 9 feet in height, of reasonable thickness, and with one or more forks or rests. They are placed as far asunder as their height; and the branches of the Vines are thrown along them from one to the other, in tiers, forming festoons delightful to the eye, and giving to the fields an air of opulence. This mode is in vogue at Saint Thierry (department de la Marne) and is very costly; but the grape ripens well, it is so exposed to the air and sun. It can only be made use of in strong, substantial soils.

In some places, particularly at Weissenbourg (department du Bas-Rhine) the Vine is trained over arbours; and in others, it is paled up against walls of various heights. The arbour-training suits gardens, but still it were better set aside, for the clusters are too much kept from the sun, and the height at which they are borne exposes them to the chilling influence of the winds. The method only answers where there are very heavy dues after hot days, exposing the fruit to mildew.

2. Of the low stock.

The low training is derived from the Grecians, and was introduced into France by the Phocian colony of Marseilles. From the South the Vine has spread over our country even into Belgium, and with it

*Among the Romans, one tree was made to bear as many as ten slips, and never less then three. *Columella, de re rustica*, lib. V. cap. 4. Plin. *Hist. Nat.* XVII. 23. The trees were placed 20 feet apart.

the prevailing method of the low stock has been adopted; and it seems the most natural, and is the most easy and advantageous.

It has undergone many different modifications, however; sometimes the plants are supported on props from 1 to 3 feet high; again the whole Vine is trailing, one stem laying over another; or the stock is kept so short that it stands alone, and the branches trail; otherwise, some slender poles or stakes are stuck into the ground around the plant, forming a circle, around which circle the stems are led and fastened. In the departments of Bouches-du-Rhone, Gard, Herault, Aube, and indeed in almost all the most southerly ones, the slips are kept very far apart, and their stock, which bears the yearling wood, is allowed about two feet of heighth, clear of branches. These are called running Vines. In the environs of Grenoble, Lyons, Autun, Auxerre, Troyes, Orleans, Agen, Albo, Cahors, in all Medoc, and even in some Vineyards of Rheims and Laon, the Vines are fastened to low trellises, either in rows very wide apart, or a trellise to each stock, but both raised only about 1 foot above the ground.

On the hills near the burgh d' Argence (department du Calvados) and also in the environs of Rochelle, no props are used, and the Vines lie on the ground till the fruit is nearly ripe; then the ends of the branches are gathered together and tied, and the whole forms a heap, on which the grapes are outwards; they are thus exposed to the sun, but the wine is scanty and of a common sort. The young Vines of Bordeaux, Lyons, Angers, &c. which used to be kept in this manner are now tied against a prop, because the shoots are very long, and have not strength enough to support themselves.

Counter-espalier Training.

Roger Schabol, who was so well versed in the art of gardening, is the inventor of this system, which is now adopted in a great many of our departments. It consists in disposing the plants in parallel rows, athwart, so that they may enjoy the sun equally The training is performed at the third or fourth year from the setting out, in counter-espalier mode; strong posts, four feet high, are planted in straight lines, the rows six feet apart; about mid-high on these posts, and running from one end to the other of the row, there is a range of slender rests laid crosswise, and at top, another range laid in a straight line. When the Vines are fit to bind (in place of training the shoots vertically or perpendicularly, as is done when they are bound to props, or even when they are fastened to such trelli-

ses as are used at Auxerre,) the shoots, left and right, are slanted backward and forward along the row of cross rests, till the espalier is complete, and the space on both sides of the stem or stock, is filled up completely. They are led along this way until they reach the top rest, to which they are bound, and along which they form a close wreath or cornice the whole length of the line. To make them close and cover in the whole espalier well and handsomely, the ends of the shoots must not be clipped until the rests seem to have as much as they can bear; and as fast as they grow they must be wound together. This method produces immense quantities of perfect clusters; owing to the stems having the full advantage of the sun, and the sap by that means being more mature; the grape too is sure to ripen, and acquires a high flavour.

Another not less remarkable advantage is the lengthening of the shoots, which are not stopped until they have spent their strength. The Vine, by this means, does not exhaust itself in a continuous formation of false buds and second shoots, which drain the juices of the wood, and impoverish its vigor: and the serpentining of the shoots causes a circulation and impulsion of the sap, more regular and useful to the plant.

Pyramid Training.

In the view of rendering the cultivation of the Vine less laborious and less costly, and more ready and productive, a great many French Vine-growers, following the example of those of Baden, and for one instance M. C. B. Prost, of Andelau, near Strasburg, rear the Vine in Cones, or to say better, *Pyramids*. This method is one which merits being well known. I shall therefore enter into the closest possible details, to render the manner of it clear from first to last.

After having marked out the ground in parallel lines 8 feet apart, there must, the first year, be set checker-wise along these lines, small stakes 8 feet apart also. Cutting from the south, (or from whichever aspect you intend the Vineyard to have) you then trench the ground, opposite each stake, in oblong squares, 2 feet long and 1 foot broad, and, according to the depth of the soil, from 18 inches to a foot in depth; the ground lifted out is heaped beside the stake, and serves, at a future period, to lay over the roots. These trenches should be thoroughly ridded of pebbles or stones, which, in the end, would cause trouble in setting out the props.

The young Vines, early in autumn, are to be set out in these sloping trenches, without any previous digging or disturbing of the soil;

the roots spread out without confusion, the stalk near at hand to the stake, and the first eye, counting from the roots, 4 inches lower than the surface of the ground. Not a root should be cut or shortened, unless it has been broken and damaged. The strongest stem or stalk is the only one to be left outwards; all others must be laid down as if they were roots. These small trenches are then loosely filled with the earth that had been removed from them, as the eyes of the plant will thereby run less risk through the winter.

This manner of setting out young Vines allows the roots a full chance of penetrating the soil in every direction, and the heat of the sun reaches them gradually and more thoroughly. In the spring as soon as the weather is favourable, the earth should be cleared down a little from the young plants, so as to lower the level of the soil collected about the stake, and the stems or branches upon the main-stem are to be pruned; only one good eye is left; the knife is laid aslant, and the wood is cut sloping backwards opposite to the eye that is kept, and about the third of an inch above it. The shoots as soon as they grow long enough should be tied to the stake; there should not be allowed more than two to each Vine.

The following year, these two shoots have now become woody stems; they too are pruned down to a single eye. But should there have been only one sprout, the pruning-knife must leave upon it two eyes. From these, there will, accordingly, be two shoots, and when they are 18 inches long, they must be topped, and tied; the wood by this, becomes the stronger.

In the spring of the fourth year, which is when the Vine buds for the third time, the posts are to be set up where the stakes stood. The two stems are then to be pruned, one to 5 and the other to 6 eyes. They are to be turned spirally around their prop, both in the same direction, leaving about 3 or 4 inches interval between each twist. Each of the stems are to be tied fast. The two uppermost shoots also, are tied, and topped when they are large enough. Some fruit is borne this season. As for the posts they should be round, strong, straight, 6 inches in thickness and 9 feet in height; of locust for dry, light soils, and chesnut or heart of oak for others. The end that is put in the ground should be thick painted with melted pitch. In the fifth year the pyramids begin to take a form; according to the taste, they may be made triangular, square, five or six-sided, but a circular form is preferable; having no saliant points it is not inconvenient like the others. The two uppermost stems are pruned as before, and with them, the spiral, always in the same direction, is continued. The other stems, which are called *side-runners*, are cut down to three eyes and are left gadding.

When the blossom has fallen and the berry is moulded, the shoots on the side-runners are nipped or shred down to six eyes. They are kept short to allow the Vine a free circulation of the air. The uppermost shoots are topped also and tied as before.

At this time the Vine which has not more than one eighth of the height, and scarcely a sixth of the breadth which it has yet to attain, furnishes already from twenty to thirty clusters; that is to say, it produces as much as a Vine, kept in the ordinary way, that has its full growth.

In the sixth year the pyramids begin to ascend, and look shapely. The two uppermost sprouts are pruned as the year before, one down to 5 eyes, the other to 6; and the spiral is continued; care being taken to wind and bind them before the buds begin to show out, not to risk breaking them off, and spoiling the regularity of the Cone. The last year's sprouts on the side-runners are now cut down to 4 eyes; if there are lateral sprouts on these again, they are not suppressed, but according to their strength are left with 1 or 2 eyes at most. The uppermost stems are tied up and topped when too long, as before; this operation is performed when the berry has set. The Vines, this season yield, from thirty to sixty clusters a piece.

In the seventh year, all the same processes are performed, the same as the preceding year; and from fifty to a hundred clusters are gathered from every Vine. During the eighth and ninth years, the same attentions are given until the spiral has reached the top of the post. From this time forth, whatever surmounts the post is to be pruned down every spring, while the side-runners are to be allowed a little longer than before. The diameters of the base and of the summit, should be in the proportion of two to one, or three to one in places exposed to the force of the winds. There need be no anxiety about the too great spreading of the outer circumference; if determined to prune it into shape, allow the wood time to strengthen, and proportion the clipping as the side shoots become firm and stout. But in no case must there be more than two eyes left on a side shoot; even some of the side runners, and at any rate some of the side shoots should be thinned out, if they are too numerous and crowded; without this precaution they will reciprocally weaken and stifle each other. A Vineyard of 2000 stocks trained in the above manner, and thinned in the fall, in cool years, of those leaves which hide the sun from the clusters, yields yearly 26 000 gals. of wine; while on the other hand, 6000 Vine-stocks trained in the ordinary way produce in common seasons only from 780 to 1300 gallons, and in the very best seasons only about 2600 gallons.

Remarks on the preceding modes.

The greater the height at which the Vine is kept, the less it matures well; especially in a northerly latitude; it will, however, reach the ripening point if planted in a sandy ground: but that will be vainly looked for in a compact, clayey soil. As far north as Paris, the Vine should be planted in rows rather wide apart, and the stocks kept no higher than 18 or 20 inches. To give full play to the circulation of the air, and to allow the humidity to be absorbed more easily and promptly, the ranges or rows should be palissaded espalier-like, that the shoots may keep in the hedge-row form.

To cultivate the Vine in festoons, or the tall-stock training, requires a warm country. The low-stock is more generally suitable, agreeing with all climates, and all soils. The pyramid training has all the advantages of the counter-espalier mode, conducted in the most discriminating manner. It requires it is true, a perfect knowledge of the pruning of trees, to attend to it as it should be done; but happily the Vine is so tenacious of life, that a few mistakes will not be fatal to it. Beside the economy of time in training, the considerable increase of the crop, both for quality and quantity, and the remarkable diminution of expense in the cultivation, the pyramid mode permits the Vine-grower to raise, at the same time, the grain necessary for his subsistence, and reduces to one third, the expense of timber for posts. These two latter considerations are important; in France it is so costly to be obliged to cut saplings for props, that a method by which they can be spared to the forests is very welcome; and by giving a variety of crops to small vine-yards, the owners will not, in barren grape seasons, be forced to run into debt for their very bread.

This mode, it may be said, requires time, which is true, especially when setting out on this plan; but the return is so much more abundant than by the usual methods, and is given so long before the finishing hand has been put to the architecture of the pyramids, that patience becomes less of a burthen than would be expected. It can be easily adapted to Vines kept in counter-espalier; and to be introduced into Vineyards kept under any other sort of training, costs very little expense; and even the first year, not a third of the crop is lost by it To train counter-espalier Vines in this way, the posts should be set out checker-wise, on the first, third, fifth lines and so on; the two stems of old wood, that are nearest left and right, are drawn to the post; and as the shoots of counter-espalier Vines spring from very low, the two lowermost shoots are selected; one from each

of the above mentioned old runners, and with these the spiral is commenced. The intermediary range of espalier is suffered to remain; and the remainder of the wood-work left, should be sufficient to support the rest of the stocks that still keep the old hedge-row.

To change the fashion of any other Vines,it is necessary to begin in the spring, by lopping with a sloping cut, every other stock, in every other row; they should be lopped as low as possible; it is even advantageous to cut nearly an inch or two below the surface of the ground, if the upper roots will allow. The edges of the wound should be drawn together, and anointed well with gardener's wax, to prevent bleeding. The old posts are left standing to support the new shoots which will sprout from the shortened stocks, on which only two shoots apiece are to be allowed; and they must be topped when they are two feet in length, to give them a chance to grow stronger. The following spring the spiral must be commenced; the Vines sprout vigorously, and the shoots bear that fall. By degrees, as the pyramids increase in height, the runners of the other stocks are pruned shorter and shorter, until finally even the stocks themselves must be cut through underground, enough to destroy vitality.

Trellise Training.

By this title I do not mean to designate the paling of Vines against walls or trellises in gardens, but that culture only which is practised on the largest scale on the Chasselas grape in the village of Thomery near Fontainbleau. There alone is this sort of training so conducted as to yield a handsome revenue to the cultivators. It will be perceived that it is adapted to the climate of Paris. The wall against which the Thomery Vine-dressers plant the slips is 7 feet in height, and roofed with tiles that jut 8 inches beyond it, forming a cornice destined to shelter the grape from the rain, without shading it too much. The wall is carefully rough cast, with mortar; and at every 3 feet of space iron hooks, soldered fast with lead, are cramped into it, to support the rungs of the trellise. An easterly exposure, on which the sun falls till one or two o'clock in the afternoon is esteemed the most favourable

The trellise is formed, from top to bottom, by nine horizontal supports or bands, slung into the iron cramps; and which are to support the main-runners of the vine. These runners are called wreaths or belts, and are led off on the right and on the left. The perpendicular supports or joists are about 2 feet high, and are tied fast with iron wire, to the horizontal ones.

The slips with roots* having been carefully prepared and kept,

* Each slip is set out in a slender basket; this precaution renders the first crop a year earlier; it is gathered the following autumn.

during a year, in good ground, mixed with vegetable mould, are set out in the month of November, with their first roots, at about 4 inches from the wall; they are planted 15 inches deep, and over against the perpendicular joists 2 feet high. Each slip gradually gives a belt on both sides of the stalk, which is led horizontally along the rungs or supports; the ground is not to be manured until the second year after planting, and to preserve its nutritive freshness, large flat stones are laid around the slips along the walls, and are not removed or displaced for a number of years.

Commonly towards the close of February, and always at the wane of the moon, the pruning is performed by cutting away all the brush of the last year or preceding years, until there is but one bud left on each branch or stem from the main stalk, these pruned shoots must also be 7 inches apart from each other. The ascending main-stalk is allowed one bud.

In the month of March or May, according as the season is early or not, the clipping is performed; only two spurs are to be left on each second shoot; and it is always those nearest the wall that will feel the refraction of the sun the most, that are to be preserved. The binding or act of fastening the new stems to the horizontal rungs, with old, soaked rushes, is to be begun when they have obtained such a length that there is danger of their being broken by the rain or the wind.

The flower, fragrant as mignonette, opens during the last 10 days of June; the green berry soon follows; upon which, in abundant years, that the large wood may not be exhausted or overdrawn, so as to injure the next year's crop, upon each shoot the two finest bunches only are to be left. The leaves cover and shelter the young fruit against the too great heat of the sun, and damages from heavy rains or hail. But as soon as the heat becomes more temperate, a part of the foliage is taken off, leaving only what is necessary to protect the fruit, without hindering the effect of the sun, which colors the grape, or the dews, which mellow it. The cluster being so near the hot surface of the wall, gilds easily, and offers the fragrant, firm, sugary, bland fruit, which is the wealth of Thomery. To keep this grape fresh, the bunches are hung from the ceiling by a string slung through the upper branches of the bunch, not tied to the end of the bunch stalk.

CHAPTER V.

ON THE SELECTION AND SETTING OUT OF SLIPS.

It must be already evident, from what has been previously stated, that every Vineyard is not planted with the same species; some even are composed of as many as twelve or twenty hap-hazard sorts, from which it results, that in the vintage season, very few of the bunches collected are at the same seasonable point of ripeness; all others, each with the mixture of tartar peculiar to their kinds, give to the wine as many different degrees of tartness; which can only be overcome by adding to the must the saccharine matter that is wanting. A selection of several kinds should be planted; not to do so, is wantonly to run the chance of a failure of the whole crop. And, there should not be more than five or six kinds chosen, but these should be of the best species for wine; and all sorts should be rigidly rejected that are subject to the Blight, or Damping off of the blossom; as well as those that cannot stand drought, and also such as are liable to rot in rainy seasons. By thus setting out from five to six varieties of the Vine, there is some one kind that will bear, when meteoric changes of the weather have been unfavorable to all others; and the wine from such a mixture is always preferable.

As each variety has a date for ripening, the utmost variation of which is from twelve days to a fortnight between the several kinds, the intelligent vinedresser will study to give them such an aspect as will equalize this difference as much as possible. The early kinds should be planted in the higher parts of the Vineyard, and the later in the middle, especially if the Vineyard is on the side of a hill.

Many planters look out for varieties that are great bearers; this is not good policy, for it is well known that the more fruitful the Vine, the less excellent the wine; the grapes are too crowded, not enjoying the free contact of the air: they cannot ripen so generally as is needed, and not having the full benefit of the sun, their juices are coarse, and not sufficiently eliminated. In consequence of this false calculation many a Vine-dresser has become reduced in circumstances; and the Vines of Argenteuil, near Paris, that enjoyed a very high reputation in the fifteenth century, are latterly of an inferior character especially since 1750, in consequence of this false policy.

Great consideration therefore should be given to the nature of the species selected, as the quality of the wine depends upon it. Propitious situations and fertile soils are wasted upon poor varieties; the must that is hard and carb ance never be turned into good wine. The best grape is that which contains the most pulpy matter; and wines of price are uniformly from such grapes.

To make a sure, correct, and safe selection, it is necessary to examine well one's own vineyard and those of the neighbouring districts, a week before the harvest. From these the slips should be selected, as the plant best naturalized is the most thrifty, and most certain to yield perfect fruit. It is not so advantageous as some are fain to say and to believe, that the scions should be taken from the vineyards of the South; the growth of them there is more rank than in more northerly climates; and when transplanted to a situation not analogous in temperature and rapid evolution of earthy gaseous compounds, although they may seem to prosper awhile, they soon dwindle and fail.

The custom is, to mix the red and the white grape. Three fourths of the Vineyard should consist of the former. It contains the most colouring matter, and is less susceptible of the vinous fermentation; by prolonging which operation, and delaying the insensible spirituous fermentation, which the red grape does effect, the acid fermentation is put off. The white grape refines the wine, imparting to it flavours that are racy and delicate.

Several months before planting it is advisable to have the ground dug to the depth of 1 or 2 feet. This preliminary operation is too often neglected, but has a sensible effect on the prosperity of the Vineyard. The second point to which attention is solicited, is, not to place a new Vine in the spot from which an old one has been just removed. The earth must be allowed time to resume its vigour: when this is neglected, the new Vine sprouts feebly, and soon languishes.

The setting out should be done in the fall, by which a year is gained,—it may be said two. Of a certain number of Vine slips, let half be planted in the fall, and half in the following spring, in the same soil and beside each other; at the end of the fifth year the former will have borne fruit for the third time, while the latter, at the same period, have barely proved their species. Besides, it is an established fact, that trees planted in the latter part of the year usually succeed, while those set out in spring, send forth but weakly shoots, and few survive. But in all things, climate must be consulted; in the South, the setting out should be done at the fall of the leaf, because the roots during winter grow and spread, and stretch to great

distances in search of the nutritious juices destined for the plant, which, by this means, can brave the drought which threatens its existence during the warm season. But in our northern plantations the most auspicious time is when the dangerous period of hard frosts and frequent rains is over, that is, about the 20th of February. To delay it until April, when the earth begins to be warmed by the sun; and when the evaporation of moisture, and of the rains and dews is rapid, leads to much disappointment. The slips perish entirely in dry springs; and at any rate are disturbed in taking root, and are evidently thrown back, by the stir and movement of the season of germination.

For setting out, either suckers or layers, or slips, are used. Suckers or layers are raised with a root after the vintage; the slips are from cuttings picked out at the time of pruning. The Vines are put down in straight lines where the descent is not too rapid, in curves or amphitheatre-like where there is a great declivity. The plants should be about ten feet from each other in the line, and between each line should be left an interval of four and an half feet; they must be set so as to face one another in every other line, which gives a proportionate distance between them on every side. The layering of layers for a new plantation is very hurtful to the old stocks, owing to their young and vigorous roots which drain the parent plant; it is esteemed better to have recourse to cuttings, they are planted in good fresh ground, and when they take root are easily transplanted. It is well to observe by the way, that the cuttings need not be set out in a rich soil; when this precaution is neglected in the nurseries of young Vines, the slip sprouts rapidly, the roots shoot far and increase fast; but when transplanted, it is not often that the new soil is equal to the old; in which case, to the planters chagrin, his slips dwindle and decline. An opposite treatment insures great vigor and the prospect of long duration to the new Vines. A Vineyard from cuttings lives the longest, and is the most fruitful, one from scions yields sooner. The former mode is preferred by those who know how to sacrifice the present for the future; the latter by those who must be gratified immediately. Those who adopt the former mode have an eye to the prospects of their children as well as themselves; and such not unfrequently, have their Vineyards renewed every forty years from plantations of seedlings. This mode certainly regenerates those primitive qualities of the species which successive planting from cuttings seems to weaken; the wine acquires a very agreeable bouquet; and the yield is considerable.

It is best to set a greater number of cuttings than will be wanted.

which gives a chance to select the strongest and most forward slips. Before transplanting them, isolated pits, or what is better, trenches, the whole length of the intended line should be opened, of a depth and width according to the nature of the soil; if it is very meagre, they should be both deep and wide; the roots will have to travel far, and put under contribution a greater superficies; in these parts, the trench is made about 2 feet deep, and 1½ feet wide. In good soil, a foot and a half of depth against a foot of breadth is sufficient. When placing the new slip in the trench, care must be taken to pulverize the soil that is to cover the roots; the vegetable earth on the surface is to be turned down upon them; that which, having been underneath, has not been mellowed by exposure to the air, is unfit to give them a favorable start. Very old stocks are slow of growth, and bear no good wood for cuttings, which should be taken from seven or eight year old Vines; the last year's shoots are not proper for this purpose; it is the two year old wood that is found preferable in every point of view; the best time for setting them out is when the ground is not over moist. Where there is a rocky bottom near at hand, [in which we counsel the use of the auger,] the roots will not speedily take the same volume as in good, fair soil; therefore at the bottom of the pit in which the slip is to be set, moistened ashes should be laid, which keeps up the freshness of the ground, preventing the baking and reflected heat from withering and drying the thinly covered roots.

Our Vine-growers are so oppressed by imposts, that they are obliged to increase their income by continually renewing their Vines. It is a pity that this necessity exists; the aged Vines, it is true, are scant bearers, and the fruit is very small; but the wine is always of a very superior quality. Young Vines are full of fruit, but the wine from them is inferior; still it is very profitable, and though less flavorous, furnishes abundantly for distillation. A proof of this difference I may give; the wines of Clos-Vougeot (Cote d'Or,) which are so very fine and choice, have diminished in value, since the frequently hundred-year-old stocks have been grubbed up and new ones planted.

It has been stated that trees were injurious in Vineyards; the question now is, are all other kinds of vegetation equally improper. All kinds of vegetables are hurtful when the Vines are planted in close rows. Lentils and lupins are never injurious. All sorts of grain beans, pease and potatoes, injure the Vines more or less according to the vigor with which each drains the soil, or the poor or rich nature of the ground. It is astonishing how much they will throw back a Vineyard in the first three years of its plantation. It is bet-

ter to sow nothing and dig the ground frequently; and the crops repay the labour with usury.

There are many weeds which trouble Vineyards and which should be kept down as much as possible; the few that are turned in by ploughing or digging enrich the soil. Of these the marygold, aristolochia, vervain, mercury and briar are accused of imparting a bad flavour to the wine. It is to be presumed that these accusations are exaggerated.

Of all the means employed or proposed to give additional vigour to the Vine, there is none more effectual than that intimate mingling and shifting of the soil produced by frequent and well directed tillage. This incorporation increases the quantity of salts already in the soil, and like a leaven, excites a fermentation in them which leads to fresh combinations, and gives a new impulse to vegetation.

CHAPTER VI.

OF THE TILLAGE OF THE VINE.

Tillage assists the efforts of nature, by developing those principles of fertility inherent in the soil. The mode, frequency, and season for tilling, varies according to localities. Where the ground is dry it should be only slightly raked; when the layer is not very deep, it should be well turned up. In many of our southern departments, the plough or the hoe are used; in the North, pick-axes of different forms, some times even the dibble, or even a large rake. The plough is the most economical means. It cuts up and divides the soil deeply, and throws it up against the stock. It neither hurts the branches nor second-shoots, when, in the first tilling, the yoke is four feet ten inches long.

Next to the plough the mattock is the best. The one in use in the neighbourhood of Paris, is a foot long and six inches wide, with a short and crooked wooden handle; but it obliges the vine-dresser to stoop much, and is very fatiguing. Three sorts of hoes are used; a square one for compact mould destitute of stones and gravel; a triangular one for hard soils full of sand and gravel; a third kind with two or three teeth, is reserved for light and gravelly, or pebbly ground. Hoeing must be carried deep, and requires great strength; it is the severest sort of tillage. The gardener's dibble and the rake are an expense quite disproportioned to their utility; in other words, they are not worth the money they cost for all the good they procure. Where the Vineyard is situated on a declivity, it is best to till the ground diagonally in preference to digging or ploughing up and down, which assists the rains in carrying away the lightest and best soil from the upper parts. After planting, there must be one hoeing to level ridges and heaps, and loosen them to give the young roots free access on all sides. In tilling, a small hollow must be formed around the foot of each Vine, to detain a proper moisture for the tender roots. The tall-stock training requires four tillings; there is only one time for tillage with the low-stock; when the shoots begin to spread there is a risk of breaking the branches and losing the fruit. The ploughing should be done as early as possible, and the digging as late as possible, say about the end of August. This operation kills the weeds, loosens the

soil, admits the air, and the penetration of the solar heat, all which increase the sweetness of the grape, and tend to secure its ripening richly.

It is, above all, necessary to till the ground frequently in the first years of a new plantation. By keeping the soil loose, it is more easily enriched by the dews and depositions of the air. The ground should be disturbed thoroughly and the roots next the surface cut and torn up; it gives an added vigor to those which remain, and makes them spread to a greater distance. After which, when the plantation has become a Vineyard to all intents and purposes, it is just as well to give one deep winter ploughing, and two or three dressings with the spade in the course of the summer, to lay down the weeds which are rife. The first dressing is usually practised just before the flowering; the second when the berry is half filled; and the third when it has reached its full growth and begins to ripen. Some vine-dressers suppress the last tillage, and delay the second, which is wrong.

But it must be understood, that in insisting on the necessity of deep tillage, it is only for loams and clayey soils; in dry and stony ground the dressing should be light and superficial; deep digging would favor too much the evaporation of the moisture. In cold ground, with a moist bottom, frequent tillage is highly efficacious; in light rich soils, it gives the reflection of the heat too great a play, and renders the vegetation puny.

Some authors have asserted that tillage disturbs the Vine without profit, and is a useless labour; Vines planted in gardens, say they, are neither ploughed nor hoed, and yet succeed well, and bear well; in Spain, on the rocks of Condrieux and through all the Lyonnois, they neither plough nor dig, and yet the Vineyards are beautiful and the grapes splendid. I shall first remark in answer, that garden soil is very loose and often moved, consequently tillage is not required by Vines in gardens. The false reasoning in this case, originates in an erroneous idea. But as for Spain, they there till twice in winter and twice in the spring; they practise beside, in May, a slight hoeing to level the soil, and make a hollow around the stock. They employ for the ploughing a single horse, fastened to the plough of the ancients; some times the same yoke draws two ploughs, each one held by a labourer. At Condrieux and in the Lyonnese district, the Vineyards receive three dressings; one after the pruning or topping, another after the flowering, and the third just before the grape begins to turn. So it is, that writers desirous of building up a system will distort facts, or quote without being certain of them; and deceive for the sole satisfaction of deceiving.

CHAPTER VII.

OF THE MANURING OF THE VINE.

Numerous and striking examples exist to prove the ill results attending the imprudent manuring of Vineyards; there are vine-growers, however, who think it useful to apply it in considerable quantities. But a quantity not only injures the quality of the fruit, but diminishes the quantity, and the wine is apt to become ropy. It is destructive even to the stock itself in many cases; the leaves the first year grow yellowish, the second year they become quite yellow, and the third season new Vines must be set out. This has been remarked in many parts of France; we have witnessed the same in Italy and Germany, and I learn by my correspondence that it is no uncommon occurrence in Hungary. There is a mean term between too much manure and a total disuse of it; and it is the quality of the article, and the discreet application of it which will make the great difference. Stable-yard litter is the least advantageous; it renders the ground moist and gives the wine an earthy flavour. If spread fresh, as has been recommended by some, its inconveniences are still greater; the parts not being sufficiently rotted and incorporated, shelter multitudes of insects and give birth to millions of weeds. When well worked and thoroughly mellowed, it helps the ground and imparts an ill flavour only the first year; but it is altogether and remarkably advantageous when it is used in a compost, combined with mould, lime, ashes and dead leaves. The litter of horses, asses, mules, sheep and hogs, suit hard, stiff soils; that of horned cattle, geese and ducks, should be applied to light soils, to which it gives coherence and body; but the litter of sheep and goats is preferable for the latter purpose. The dung of fowls, hair, feathers, shavings of horn, all which decompose slowly during a moist, hot spell, are useful. Pigeon dung is the most active and fertilizing manure, but it contains a great proportion of alkali, and should be spread with the greatest parsimony. It will agree with almost any sort of soil, according to Oliver de Serres, and gives no ill taste to the grape. The cleansings of ditches, ponds, and running streams, as well as the filth of roads, yards and streets, will make a good manure; but must be used with great moderation. Owing to the

excessive use of the street-dirt of Paris, the vine-growers of Surene have destroyed the reputation of their wine, which was formerly in high esteem.

But the enterprising vine-dresser will find admirable manures in the vegetable kingdom, by ploughing under plants in flower, to ferment and decompose in the soil; and beside the economy of this method, it does not injure the wine. On the splendid hills of Damazan, (Lot and Garonne) where the Vines form broad luxuriant screens, and produce a coloured wine that has an agreeable perfume and much delicacy, they have a custom of sowing the lupin. This plant is in flower during the time of tilling; they turn it under, and it forms, without the expense of transportation, a manure that is evidently strong and profitable, from the abundance of their grapes and the fertility of the soil, the greater portion of which is sandy. Buckwheat also is recommended, sown just after the Vintage, and ploughed in by the first winter tillage. Brambles, briars, heaths also ameliorate the soil; but the most likely application is the clippings of the Vine, buried around the stock as soon as cut; many vine-dressers consider this the best. Others prefer the use of the green Vine leaves. They easily decompose, and cannot alter the flavour of the wine. Lucerne and clover also restore to the earth more principles of fertility than they have abstracted from it. In the environs of Toulouse, in Vine-yards which are situated on heights, and where the soil is stiff, clayey and subject to be carried off by the rains, they sow sanfoin every ten years. While it is growing the only care they take of the Vines is to prune them, and they yield scarcely any thing; but when the sanfoin has stood two or three years, they plough it under in the third or fourth season; the soil is re-invigorated and the vintage is abundant.

Wrack and sea-weed are used in some Vine-yards near the sea shore; but they have to be mixed with other manures, and employed in moderation. The grape takes a taste like the rankness of the sea-weed; the wine also receives a large addition of soda from this manure, and is never fit for any thing but the making of brandy. But of all the manures, a compost of different earths is the most acceptable to the Vine; earth, for instance, raised from meadows, woods, &c. and of qualities different from the soil of the plantation; that is, if light and open, a close compact loam should be added; if on the contrary, heavy and hard, light dry kinds of earths should be used. This mixture produces the happiest effects.

There are several ways of applying new earths on the Vine-yard; a scuttle-shaped basket is very convenient where the Vines are on a slope; the wheel-barrow and dung-cart are more economical; but

for the wheel-barrow, the ground to be removed should not be far distant from the Vineyard.

The dung-cart requires the assistance of two oxen and two labourers, and may injure the runners and shoots; therefore it should not enter the Vineyard; but the earth should be discharged outside, and the barrow will serve to transport it to the Vines. The time at which this is done, is generally from the latter part of April to the beginning of June; it is better to do it in the fall or beginning of winter. In cold countries it should be delayed until pruning.

According to the observations of Rozier, the Vine needs no manuring so long as the stock retains a deep brown hue; but when it takes a lighter shade verging upon the yellow, it is an infallible sign of weakness; then it will require the earth to be renewed every five or six years. The duration of the fertilizing properties of the new soil, depend on certain points in its quality; if it is earth that has been washed away by rains from the Vineyards, its effects will not last long. If the new layer is fresh soil, and a thick coat of it be spread, the Vineyard will require no other for ten, twelve, or fifteen years; and so in like proportion, if the layer be slender, the needs of the Vine will again return in a few years.

CHAPTER VIII.

OF THE INFLUENCE OF THE WEATHER ON THE VINE AND ITS PRODUCTS.

After having pointed out the effects on the Vine and its products of the soil, the mode of culture, the tillage and manuring, it may be most proper to state, what is the influence exerted by the state of the atmosphere. A cold and rainy year, whether in southern or northern latitudes is hurtful in every point; the Vine is fond of a regular heat, and it requires a hot sun to ripen the grape. When the atmosphere is cold and damp, the Vine languishes, and the fruit is neither sugary, nor fragrant; the wine is insipid, and sours easily, or soon turns ropy. Winter rains, especially in places where the ground is marly and liable to become miry, prevent the ploughing, pruning, and other operations which the Vine requires. In the spring, at the budding season, great rains will cause a premature unfolding of the buds and leaves, and lessen the production of fruit. When the bunch is in flower, they blight the pollen of the blossom, especially if they are cold and heavy; when the berry is half-grown, they prevent its increase; when it is a little further advanced, they deprive it of the sugary savour peculiar to it, or make it ripen late; or if they take place at the vintage season they rot the grape, making it furnish, on fermentation, only a tartish-tasted, watery beverage.

High winds are always prejudicial; they dry and harden the ground; they blast the young shoots; they prevent the fecundation of the flower, and deprive the berry of its inherent moisture.

Spring frosts and hail are two severe scourges of the Vine; in one moment they diminish or destroy utterly, the hopes of a whole year of labours.

Fogs are equally hurtful to the stock, the flower, and the fruit. Besides their rendering them more apt to suffer from frosts, the clammy moisture they deposit over every part of the plant, wets it more completely than the earth, and exposes it, the sun drying in a moment this superficial humidity, to a heat the more injurious, because so sudden

Too much heat also has an evil effect; great heat, it is true is necessary to ripen, refine and perfume the grape, but if excessive, and continued, and at a time when the earth is dry, it burns and does not vivify. Its results are similar to those of fall frosts and tempes tuous winds. They are worse felt in the North than in the South, because, in the latter the roots of the plant are much stronger and larger.

The most favourable season is when the flower opens during a dry, warm, tranquil spell; when light rains occur frequently to nourish the growing berry; when a regular heat without interval of foggy, muggy weather developes the bunch, and ripens the fruit; and when fair weather presides at the joyous period of the vintage

CHAPTER IX.

ON THE MEANS OF RENEWING VINES AND VINEYARDS.

The proper methods for renewing the Vine are layering; intrenching; stripping the old bark, and pruning. Of the latter we shall treat in a chapter by itself.

Of Layering.

Layering creates new stocks; but if too often repeated on the same roots it eventually renders them sterile and useless. The process of layering need scarcely be described it is so universally known. But its application to the Vine consists in putting down and burying an old-wood stem in a pit about a foot large, allowing only five or six of the branches, (if weak, and if strong, but two) to remain above ground. This is not only a mode of restoring Vines, but the way usually practised for perpetuating good roots of the grape, such for example as bear long bunches, with a double row of close-set berries, flattened by their pressure against each other. The time for the operation varies according to the climate. In warm countries the fall is best; if done later it does not succeed well, the months of April and May being, in such climates, altogether wanting in those mild rains that so happily foster the young layer. In cold countries it must be deferred until the 15th of February. There, by layering in fall, the heavy winter rains, and surface water and moisture, chill and weaken the sucker; but even there by delaying the operation till spring, it disturbs the main direction and impulse of the sap, and drives it into all the buds, when the grand object is to keep it for a few. But in mid-February, there is no diversion made to the flow of the sap, the channels of which are unoccupied.

The sucker, when removed from the old stem, is to be pruned with a cut slanting backward and downward from above the eye that is kept, and ending opposite to it. When set out it should show only three or four joints, and be provided with a prop to prevent it from giving straggling, slender shoots, which would suffer from the plough in the first tillage. Great care must be taken not to let the earth fill up the trench in which the layers are set out, or the best roots will

spread there and by being so close to the surface expose the plant to all the casualties of the weather, and all the various operations of tilling and training, that must be carried on about the Vine. But neither layering nor the setting out of layers should ever be intrusted to the hired vine-dresser or labourer. The injuries that may be done by careless digging and hasty work to the young stocks can scarcely be calculated. When done with the attention and care due to the operation, it has these advantages besides those already enumerated. The sucker yields plentifully and affords a strong wine; it allows the bunch to be kept near the ground, in places where the low culture is strictly indispensable : and the stocks from layers will last considerably : there are even instances of immense duration, as in the vineyards of L'Yonne, Cote d'Or, and Saone and Loire, which are two hundred years old, and the wines of which, as also of the vine-grounds of La Chainette and Migrenne near Auxerre, are generous, delicate, and strong; and those too of Mares-d'Or, (district of Dijon) which are racy, nourishing and of a high relish.

In some districts they only layer in young plantations, in others they do it from time to time to renew old stocks; and in others they annually layer a quarter, or sixth, or eighth, or even less, of the whole of their Vines. The first method is improper when it is done to multiply the original number of stocks, because by the frequent repetition it wears out the virtues of the variety, and renders it inferior. But when practised to fill up the space of occasional dead stocks it is perfectly recommendable. For the second case it must be said, that it is needless to wait till a Vine is dead to renew it; the proper time is when its pristine vigor declines; and when its produce diminishes in quantity, or what is of more consequence, in quality. The third method cannot meet the approbation of any man of science, because its purport and tendency is to perpetuate the culture of the Vine in the spot it actually occupies for any period of years, and the Vine, like all other plants, will in time exhaust the earth of those principles which alone nourish it.

After a certain lapse of time it should cede the soil to some other growth, that by the alternation of other vegetation, the mould may become lively and fertile, in place of being impoverished and dead.

Of Intrenching.

When a Vine either by age or the poverty of the soil begins to fail, the vine-dresser may postpone its ultimate fate by this operation, which will reanimate it, and it will yield in consequence for five,

ten, or fifteen years longer. Intrenching is practised from the month of December until March, or until the buds begin to swell. This operation must never be attempted on any part of the plant save the stock itself; if done upon a branch, that branch attracts to itself the nourishment of the whole plant, and the rest of the Vine bears feebly, and its leaves soon fall; those also who do attempt this, generally make such a shallow trench that the new roots are continually cut up by the plough, the hoe, and the mattock. It is still worse if any thing can be, to select the side-branches instead of the main, or upward branch. The former give to the hand more easily, but the latter requires less nourishment, and does not drain the sap as rapidly and entirely.

The best case for intrenching is when a young stock becomes diseased. I have known several Vines attacked by the Yellows, which were intrenched in consequence, and have prospered amazingly; because new roots were distributed horizontally and near the surface, instead of penetrating downward to the cold, stiff, moist layer of earth, which had been fatal to the first roots.

A whole vineyard may be renewed, by intrenching the old stocks in entire. By this the stock, existing for itself, fills itself with nourishing fluids, and performs the offices of an immense root, giving birth to three, four, or five new stocks, all vigorous and long-lived. The pit that is opened for this purpose must be dug so as to allow of carefully grubbing out the earth from under the old stock; the roots are then cut loose, and the trench deepened so as to lay down horizontally the old trunk, and the branches are disposed of in the corners of the trench. The earth is then lightly thrown in over the whole, and a little stable manure scattered over the top of it. After the third season the new stocks are separated from the old trunk.

Of Barking.

Several vine-growers of Ville Franche (Saone and Loire) and others of the Lyonnois, have adopted of late years the plan of scraping and tearing off all the old bark from their Vines. It revives the plant greatly, and also destroys an immense number of insects which shelter in the long rents of the bark. It increases the quantity of the grapes without injuring their quality, and heightens the natural flavour. Barking is a preventative and also a cure for many diseases or injuries that are severe upon the vineyard, and is as safe as efficacious.

CHAPTER X.

ON PRUNING.

The Vine if left to itself shoots up too high, it bears for two or three years, but after that degenerates, languishes and yields only slender clusters. This is the origin of the necessity of pruning, which confines the powers of the sap to a few branches, thereby increasing the produce and rendering the grape more honied and mature. Pruning is therefore essential; he who undertakes it must be both intelligent and wary; and habituated by theory and practice to the knowledge of its effects, so as to be able to account as he goes for every application of the knife; for it influences not only the coming crop, but also the health of the Vine, and consequently its future duration and profit.

As the Vine only yields fruit on the new wood, it follows of course, that the pruning must be so cast as to keep up the lowermost and most vigorous shoots, and must be adapted to the age, strength, and character of the plant, to the nature of the soil and the mode of training.

The first pruning is easiest, it is performed by clipping in entire the shoot that originated from the uppermost of the two eyes left above ground on the slip, and by clipping the other shoot close above the eye that is left.

At the second pruning, if the plant is to be dwarfed, the lowermost branch only is to be left; if a low-trained Vine, two branches with buds are left; if a middling Vine, three branches are left, and pruned, and all the rest are cut off as close as possible to the main stem; but in all cases alike, on the branch or branches that are spared, only one eye apiece and that the nearest to the trunk, is left behind; the rest of the wood is lopped away. In the third pruning one more eye is allowed to each of the above-mentioned main or first shoots which are to be the main branches. Of these, three, or perhaps four, is enough for the middling Vine, or even a tall-stock one; two are enough for a low-stock Vine; and as in dwarf Vines the fruit-bearing wood is to spring directly from the trunk, they must be kept low, but not so much so that the grapes should lie on the ground.

It is of frequent occurrence in the third season, for a vigorous shoot or scion to spring from the foot of the Vine—It will injure the plant unless the head of it be clipped.

In the fourth year the Vine begins to yield fruit; the two or three most likely and able branches must be cut down to two eyes apiece, and this is all the wood left standing.

In the fifth pruning, not more than five runners are to be left standing; the lowermost shoot must have but one eye; and the other strong branches are to be pruned to two eyes apiece.

When the Vine has reached the sixth year it is shaped as far as pruning goes; from that time it must be regulated according to climate, the training of the stocks, their number, the space between them, and the quality of the soil. The pruning then is classed into short and long.

The number of runners that are to be left, varies; however, all must undergo the operation of pruning, save Vines that lie fallow.

The tall-stock Vine can be allowed four runners with nine eyes to each; but to prevent the sap from rising too fast and running to leaves, the branch must be twisted at its origin; this increases the fertility of the plant, and improves the grape.

In a middling Vine, where a head, or pollard, of three or four main-branches is allowed, five or six runners may exist on each of these branches, and each runner may be permitted to retain from five to six eyes.

A low Vine with only two main-branches, should have no more than that number of runners on each, so as to cause an equal and regular flow of sap, and prevent it from flowing to one side more than the other. If the Vine prospers, yet does not bear for two or three years, the pruning must leave the wood long; and on which ever side it seems least fertile there should be a little manure applied, which is better than to cut some of the roots on the more luxuriant side, as some recommend.

For a dwarf Vine, three or four runners, with one or two eyes apiece, are enough to be left by the pruning knife. If the Vine is old, it should be pruned down very low and topped often. If any shoots should spring from the foot of the stock they are from an old Vine acceptable and welcome, and are to be scrupulously taken care of, as they may serve to renew the stock.

When the plants have been much bruised and broken by hail, the old and new wood both, must be cut close to the main stem. If a late frost has caught the new shoots or destroyed them, those which are any way hopeful must be topped; and the year after, that wood

alone is kept and dressed by the knife which has sprouted sub-eyes. There is no need for hurry in clearing off the frozen wood, nor even the buds partially caught; for it is no rare thing for the latter sprouts to bear. If the Vine bleeds, length must be amply allowed to all the wood and but little be removed, all which the year after can be properly reduced. When the mould is deep, a plenty of runners, or main-branches may be allowed, but not so if the soil be thin and poor; in any case it exhausts the stock if there are more than four runners with three buds on each. In a poor soil, two branches to the stump, with three buds or eyes on each, are enough. In a wet loam, pruning must be cautiously given, if at all. In dry years the Vine makes very little wood; then the pruning may be thorough: the Vine should be thinned out greatly and pruned short; especially if there has been a severe winter.

Some varieties require to be left long, others to be dressed very close; but with all kinds alike, the operation should be performed with sharp instruments, and that wood which is old and dry and will delay the circulation of the sap, be cleaned out and cut very close to the healthy stems.

The vine-dresser when he prunes, ought always to have at his side a sharp mattock to clear away the earth from the root of the Vine so as to cut off as deeply as possible, all the suckers; when this is done without opening the ground, they sprout up again more numerous than ever, and by abstracting sap from the fruit-buds injure them considerably. Each one has a particular motive in his manner of pruning; one does it for the present crop; another to make his Vine look handsome; a third for the crop two years ahead; a fourth who keeps the main chance in view, takes care of the large, vigorous stems, and heeds little whether the Vine is too high or ill formed, only considering the crop; as the proverb says, *rather a stock well filled than one well trained.* The principal point is, to know and seize the right time for pruning. To do it too soon advances vegetation and exposes the young buds to the nipping of the cold, or even spring frosts; if too late, it retards the development of the buds, and perhaps destroys the fruit-buds by their becoming drenched with the bleeding sap during the night; or perhaps a late frost happens, and finds the retarded sprouts so backward and tender that it will entirely destroy them.

In warm countries, some pruning should be performed after the fall of the leaf; it gives the grape a greater chance for ripening and becoming sugary; but to prune in fall or beginning of the winter, in cold countries, is imprudent; it is proper to wait until the black

frost is over. The first fortnight in March is the best time for the vineyard in the centre and North of France, and it should only be done when the weather is fair, dry, and without appearance of rain.

After the sap begins to circulate, it is improper to prune the Vines, unless such as are sprouting too luxuriantly, and which require to be weakened, those in a proper condition it weakens too much; they seem exhausted and yield only poor fruit.

In pruning it is important to do the topping neatly; it should be done with a sharp knife, and the cut be made cleanly, and slanting backwards and downwards from about an inch and an half above the last eye that is left. The rain does not penetrate such a wound, nor the frost, if there is any in the months of April and May, reach the neck of the joint through it. In several districts they have a way of cutting the branch in pruning straight off; but it is a worthless fashion; it exposes the bud to all the stress of the weather, and if the bud be crushed or split, the loss of the fruit follows of course. It is a mode productive of great disappointment and loss.

When one single eye alone is left, there is always some risk that that eye may meet with an accident, in which case the stock or stem will be likely to perish, especially if it be weak or unthriving. To avoid this inconvenience, prudent vine-dressers always preserve two eyes, at liberty to make afterwards a more rigorous lopping.

In pruning for the wine crop solely, many more branches are left than in simple pruning for the preservation of the Vine; but it soon exhausts the plant and hastens the necessity of replanting. This is the mode pursued by vine-dressers who work vineyards on shares, and planters who follow the old adage, *the Vine should sink under its crop*. But they generally neglect to bend in time the long runners, stems and sprouts; they leave them very long with the intention of having much fruit; but the sap ascending with too much ease, developes the uppermost or woody buds, that is, the buds above those which turn out to be fruit bearers, and if the season is hot and moist, or the plant is very vigorous, the fruit-buds will dwindle and be lost entirely. As a general rule for the application of pruning, it should (according to the different kinds and varieties or situation of the plants, independent of other differences) be made so as to leave the wood long, and but a few branches, for kinds that have a dry, solid wood; of such as have a very pithy wood, the main-branches may be many in number, but their stems should be left very short. The newness of the soil in the culture makes a modification of the necessity for pruning; there are situations, such for instance as the island of Santori in the Archipelago where they never prune until the tenth year

For the last twenty years in the department of Marne they have made use of a very simple and expeditious means for pruning, by which a child of ten years may do without fatigue the work of an able dresser. It consists of a crooked knife that does not close, and which has a wooden handle about four inches long and an inch thick; the thumb of the hand that holds the knife is provided with a hard white-wood thimble or thumb-case, large enough to fit well. With the left hand the workman puts the twig to be cut between the edge of the knife and the thumb-case, and clips it with perfect ease, without so much as moving the arm or the wrist. The twig is cut three inches above an eye; and this sort of cutting is found on trial to be as useful as simple. This process singularly diminishes the fatigue, and simplifies and hastens the operation of pruning, which has often to be done with promptness. The child can neither wound himself nor his neighbours, and cuts the stem boldly, rapidly, and neatly. There is also a newly invented pair of shears for pruning, controlled by a spring with which even the most ignorant hands can do the pruning expeditiously and regular. They are known by the name of the Vine Shears, (*ciseaux pour la vigne*) of *Edme. Regnier.*

CHAPTER XI.

OF CLIPPING, OR BUDDING.

Clipping is an operation intended to divest the plant of superfluous branches, and strengthen those which are bearing fruit. It is a means of making the Vines flourish and yield grapes that are long, full, well gilt, having much mucilaginous pulp, and fit to produce superior wine.

It has an influence on the duration of the stock, and the crops of successive years. The execution of it is almost always abandoned to women or even children, which would not be the case if it were only generally understood that it requires as great a combination of ideas as pruning; in that case it would be reserved for sensible and instructed vine-dressers.

A stock well clipped, with the superfluous sprigs shorn clean to the stem, is easier to prune next year. But a female day-labourer or child can scarcely be competent to judge what shoots to suppress or which to leave, especially if the Vine has but few branches. Suppose there are two or three weak stems, each with a bunch, and two vigorous shoots, springing from the foot, but without fruit, as often happens in years when there have been hard spring frosts,—they will suppress those two fine shoots without perceiving that they deprive the vine-dresser of one resource for the layering of the following year. When there is a superflux of grapes, they are not apt to cut off the foot-scions, because those too have grapes upon them; and being left, they materially weaken the powers of the fruit-bearing stems. If they find on the newly pruned wood, shoots too large to be easily taken off by the hand, they generally twist them off rudely, and make a large gash in the new wood, instead of cutting them off with a sharp knife quite close to the knob of the eye. If the spring has been unfavorable, and there are a great many branches without grapes, they will not be likely to leave on the newly pruned wood three, four, or perhaps five of the strongest shoots, according to the

strength of the stem, so that the sap may be drawn in that direction, and the next year's harvest not suffer entirely in consequence of the want of good wood.

As may be seen from the above suppositions, the regulation of this process is of serious importance; it depends on the localities, on the degree of richness in the soil, of the present and previous state of the atmosphere; so also, the period at which it must be done.

As a general rule—the vine-dresser, before he begins to clip, and crush away useless buds, must wait until the fruit is formed; it must be done in fine weather, when the sun has well dried the ground and rendered it firm, so that the trampling and beating down of the feet around the plants need not have as serious effects as if the earth were moist or miry. To wait until the Vine is in blossom exposes it to blighting. By leaving too many shoots for wood, that is sterile shoots, the fruit-bearing branches are deprived of the necessary aliment; and by leaving too many fruit-bearers, the stock is exhausted, and several bad seasons are the consequence.

No clipping should be performed without the aid of the pruning-knife; by breaking off large shoots, already grown woody, large wounds and rents are apt to made in the main-stems, which are hard to be healed, and lead sooner or later to untimely decay.

CHAPTER XII.

OF PROPPING OR SUPPORTING.

The use of props is not general; in some vine-yards they only tie together the stems at top, without giving them any other support than they lend to each other; this practice was in use among the Grecians. But in the greater number of vineyards, especially those in the northern departments, propping is looked upon as one of the most profitable modes of cultivating the Vine. A long pole or prop, or post is put down beside each stock and the large shoots are tied to it with straw, or rushes, or osiers. There is a diversity of opinion on this subject among our most celebrated vine-growers. Those who are in favor of it, say that a propped Vine yields wine of a superior quality; that it resists the force of the winds; that there is a long period during which it can receive tillage; that it is not subject to being choked up by the weeds; that the fruit is clean and free from being spattered with dirt by the rains; that it is less liable to rot; and is more exposed to the genial influence of the sun.

According to the others, propping is more injurious than beneficial; that, firstly, wood being scarce and high, it unprofitably swells the list of troubles and expenses attendant on the cultivation; secondly, that the grapes are held too far from the ground for a fully sufficient ripeness; thirdly, that great and long continued heats render the ascending movement of the sap dilatory, and the elevated stock is therefore not as productive; fourthly, that the bunches pressed against each other, shade each other too much, and deprive each other of the sun and air; fifthly, that the post or prop, presses, wounds, breaks or tears the roots, and opens a passage for the rains, which consequently makes them mould, and necessarily brings on the rot.

I shall not discuss or contradict the one or the other. There is both truth and exaggeration on both sides. Custom is law; whether the prop be planted at the foot of each stock, or whether in the centre of four, trained over it in hive or dome-fashion, the difference is all one

to me, I shall only examine the manner in which the posts should be made.

The most proper wood is, without denial, heart of oak; the next best, chesnut and mulberry; even elm, ash or maple may be used; but willow or poplar should be avoided, and also alder, the porous, sappy wood of which scarcely lasts a year. Coppice-wood or sapling props are very poor, although the wood be seven or nine years old. Good props should be of logs of fifteen or twenty year old wood, five feet long, six inches thick, and split in four; the corners well smoothed by the hatchet, the sharp end charred, and the bark stripped entirely. The time for putting down the props is just before the first spring tillage and before the shooting of the buds. They must be put down deep enough to stand the winds and drought, but with care, so as not to injure the roots.

CHAPTER XIII.

OF TYING OR BINDING.

There are, properly speaking, two sorts of tying or binding; the first for espalier Vines is *binding*, and consists in nailing up the branches and shoots against the wall with loops of osier. The second, for propped Vines, is tying; it is to fasten the young shoots against the prop or palisade of posts.

The tie is put round the third or fourth joint above the last bunch of the uppermost shoot. If there is considerable new wood of different sizes on the stock, and these shoots would be forced too much from their natural position by tying all together, the tying should be performed in two or three places; otherwise the grapes will be liable to rot. A twist of rushes, bass or rope of straw is used for this purpose. In clipping, there are often some shoots or sprigs neglected to be removed; they should be cleared out at the time of tying, as also those that have grown out since the time of clipping.

The most favorable time for tying is immediately after the flowering. Then the new wood is all nearly quite evolved, and is tender and requires to be fastened, to allow no purchase to the wind, which stunts the shoots, or what is worse, breaks them short off at their origin.

In the larger part of Southern France, tying is thought useless; in all the northern part part its excellent effects are highly prized. We owe to it the superior wines of the Marne, and much also is due to it for the support it gives to the slender, thin stems of the *Pineau* or *pine-cone* grape, the staple of the renowned vineyards of Cote-d'Or of L'Yonne, and of Saone and Loire. Doubtless, tying is expensive, but its advantages compensate the time and money that it requires. In the South, they may get through without it, but in our northern departments it is indispensable.

CHAPTER XIV.

OF TOPPING.

This is an operation which is performed on the shoots and lateral wood, after they have been fastened to the prop and are from two and a half to three feet long. The young shoot is brittle, and so is generally broken at the joint, or else cut with the pruning knife; it should be cut about an inch above the knot and care should be taken to keep the leaf just below it. It is always done at the same time as the training, and is left to the skill of the women, though wrongly so:—because the operation is sometimes useless and even to a certain point injurious; at other times it is necessary, to give play to the sap and accelerate its influx in the direction of the fruit It takes but little time or trouble to do it well. On Vines trained along low trellises, all the strong shoots should be topped at the ninth or tenth joint; perhaps a little higher or lower according to their situation. The shoots that gad above the props are topped, to allow them no higher than their props; and all feeble new wood is topped at the seventh or eighth joint. If it has not reached that number of joints it must be let alone until the second topping, in the first week of the month of August.

The second operation requires more care than the first; it consists in cutting at the second joint all the sub-shoots that have sprouted out on the already topped new wood; it is done to force the sap to retrograde and aid more efficiently in strengthening the stem, maturing the fruit, and predisposing the lower part of the yearling wood to form fruit-buds. It is sometimes delayed till the vintage is near at hand, especially if the weather is very hot and dry.

There are some stocks that will require to be topped three times in the season; the third topping is done when the grapes begin to turn, never before.

The toppings are given to horses, cows, and sheep, who eat them very greedily; but as they are very heating, it is best to spread and dry them and then stack them for winter fodder. This fodder has a sweet and high relish to cattle.

CHAPTER XV.

OF GIRDLING.

Girdling is a means of forcing the ripening of the grape, and increasing its size and qualities. By the oldest records we have, it appears that it is a process that has been long and well known, and was used to prevent the blighting of the Vine. All writers on agriculture, from Theophrastes and Pliny, down to Julius Hygin, speak of it in the most unequivocal terms, as a practice in use among all the gardeners and vine-dressers of their time.

It was accomplished by twisting, wrenching or half-breaking the branches; by driving large pegs into the trunk; or finally, as I have seen done by many farmers in Italy, by taking off from the stems circular bands of bark, of indifferent breadths, shortly before the opening of the flower. Notwithstanding its utility, the method had been lost or dropped during the middle ages, or only used in some circumscribed localities.

In the beginning of the XVIIth century *Olivier de Serres* revived it in France; since his time *Magnol* recommended it as a means of increasing the quantity and quality of the olive crop. *Buffon* and his worthy disciple, *Duhamel Dumonceau*, tried it on other fruit-trees. *Rozier*, on his side, tried many experiments with it which are recorded in the Agricultural Transactions; while my late friend, the celebrated *Andre Thouin*, of the Institute, has demonstated its surprising results; not only on all the trees comprised under the head of stone or seed-fruit, nut or berry-bearing trees, but on woody plants of very distant families. For a practical proof of its application to the Vine, I may cite *M. Lambry*, who owns a large nursery at Mandres, near Brie-Comte-Robert, (Seine and Oise,) and who has girdled his Vines regularly for the last forty years, and constantly recovered large and excellent crops. Such is the abridged history of girdling, against which, from time to time, some idle ignoramus raises here and there, a solitary voice.

Girdling should be resorted to when a cold or damp spell retards

the evolution of the fruit, and six or eight days before the blossom opens, rarely longer and sometimes less. It may also be done at any time from the commencement of the ascent of the sap, and so long as the blossom lasts, but it is better that it should be rather near to the time of flowering than distant from it. If done late it is of no service to prevent blighting, though still it preserves its other properties, those of hastening the ripening, and of securing an abundance of fruit, and of a finer quality than can be had otherwise. It may be done as well on the old as new wood; that is, on the stock, the main-branches, the old laterals, and the shoots of the year. However, last year's wood should be preferred; the wood of the year bears the fruit, and is too tender at the season for girdling to allow the operation to succeed well.

The way it is done is to remove a ring of the bark or cortex, clean to the true wood; not a particle or fibre of the pellicle, (the liber,) between the wood and the bark should be left. The size of the ring should vary from the 1–14th of an inch, to an inch in breadth, according to the subject, the soil, the season, the exigence of the case and the intention proposed by the operation. This ring insensibly spreads; the foliage takes a maturer look; the leaves become of a swarthy red if the wood is affected. Some days after, a fortnight at furthest, the cambium, (the viscous sap between the wood and the liber,) exudes from under the bark, like a gum, gradually hardening, and extending over the wood without adhering to it, and forming a slightly salient, barky collar, or pad, around the stem. This pad at first runs rapidly, then more slowly, until it reaches the lower edge of the ring, to which it unites itself, resembling the bark as much as possible, and in the second year becomes a real cortical formation. When the encrustation becomes complete around the wound, then the grapes swell, begin to change their colour, and by their forced maturity are ready for the wine-vats eight or ten days sooner than they would have been without girdling. If the supplemental bark does not form, the girdled branch dies the next spring. This is of no importance to the Vine, as at that time it would of course have all the last year's sprouts, (with the exception of stools from two or three at most, to be left for the new wood to spring from,) cut off and cleared away. If the girdled branch does not bear enough of fruit the second year, the operation may be repeated.

In good seasons, girdling should not be resorted to; it is then quite as hurtful as it is of service in rainy seasons. For a general rule, also, it must not be done every year, unless on stocks that are very sterile, and hard to bear, or are given to blighting. On stool-vines

that is, vines that are low and support themselves without propping, girdling too often repeated, would be fatal. For low vines, the incision should be made on the wood of the preceding year, below every fruit-bearing shoot. The wood above the incision profits by it, while that which is below, together with the root, suffers : but, as the part which has profited at the expense of the rest, becomes a root next year, by layering, with the strongest fibres springing from the barky ring, because that is the thickest part, there is, finally, nothing lost by it, but rather a gain.

In tall-stock training the girdling is done at the spring of the bend ; that is, the fruit-bearing branches that are twisted to stop the elongation of the wood, and prevent the descent of the sap, have the incision made just below the wrench. In stool-vines, it is the fruit-bearing stem itself that is girdled, unless the shoot is too young and slender to allow any operation. If every one of the stems were to be girdled, the new wood would profit at the expense of the old wood, and as, (unless they be layered,) all that new wood will be pruned off next spring, the Vine would suffer a great waste of substance without any sort of use : and would soon sink under such unnatural handling. It has been said that girdling can only be an agreeable occupation for an amateur or market-gardener speculating in early fruit ; a physiologist studying the secret springs of nature ; or an enlightened agriculturist, seeking remedies for an irregular diffusion of the sap ; all such, finally, as can afford to sacrifice branches or even the plants themselves, for the sake of their profit or instruction. On account of this character of inutility having been imputed to girdling, experiments have been undertaken in several vineyards. I shall give them as they have been transmitted to me.

In the department of Cote d'Or, shoots of the Pine-cone grape *(Pineau)* and Gamet, girdled in the spring, yielded bunches more filled with berries and those of a larger kind and more sugary flavour, than the rest : they also ripened twenty days sooner than those on the neighbouring plants that were not girdled ;—but it was remarked, especially at Beaune, that the juice gave but slight indications of tartaric acid, the presence of which is thought to assist in the preservation of wines. It was by some, recalled to mind, that girdling had been formerly in use in that department, under the title of *controlling*, but was given up on account of its weakening the stocks and causing the wine that was made from them to be unfit for keeping. In the department of L'Yonne, several rows were submitted to the operation, alternately, every other row being left untouched. The consequence was, that none of the girdled Vines blighted, and the fruit on them ripened ten days earlier.

In the vine-grounds of Epernay, *Champagne*, (de la Marne) the shoots of a number of stocks, subject to blighting every year, no matter how favorable the season, were girdled with perfect success. The grapes were large and full, while the Vines that had not been experimented on, bore none at all, or very meagre ones. The planters of those vineyards do, nevertheless, think girdling an unsuitable operation. "Our high, delicate, neat wines," say they, "are made from "grapes picked out with great care, from among the slenderest and "most thinly furnished bunches; such, of course, as have been "affected by the blighting of the Vines. By preventing blighting, "therefore, it is very likely that we may injure the quality of our "wines, which is essentially the basis of their great value, high "price and extensive consumption.

In the departments of Rhone, de l'Ain, and Loire, where girdling has been in use since 1790, at which time Lancry, a botanist and farmer of great acquirements made it the vogue, they are well convinced of its importance, but it is thought that its advantages are at the expense of the girdled stems, which are apt to wither and finally cause the loss of the branch, if the edges of the wound do not become encrusted in time. In the departments of Seine and Marne, la Vendee, Deux Sevres, Gironde, Basses Pyrennes, and in all those situated on the sonthern shores of the Rhone, its efficacy in preventing blighting has been fully established. All the stocks that it has been tried on have given fine grapes which rapidly attained their natural size, and were full ripe long before all others.

At Meudon (Seine) and in a few other places, it has been observed that the wine from girdled stems is pale and less alcoholic; on the contrary, in the vineyards of Meurthe it is of a richer colour and every way better than that from the branches that have not been subjected to the annular incision.

In the department of Ariege, it was found that girdling on young wood makes it liable to break with the first blast of wind, but that this inconvenience does not exist when it is the old wood that is operated on, the shoot of which is solidly attached to a prop.

The reader should be warned not to draw a rigorous conclusion from these various opinions and singular facts; our theories in vegetable physiology are not yet complete enough to account for all the curious accidents that now and then occur. Sufficient attention also is not given to the inequalities of contexture in the different species of the Vine, to the influences of the soil, exposure, climate, manner of culture, &c. &c. All these points, which are now either obscurely understood, or very difficult to estimate, may cause very different results in cases absolutely the same to appearance.

What I can affirm is, that far from having observed that grapes from girdled stems were less rich in colour, less sugary, or more watery than others, I have always seen on the Vines of those planters who used this operation, that the grapes were larger, more plentiful, more sugary and more vinous. Moreover, these qualities, indispensable for a superior wine, must be the result of girdling, the undisputed and positive advantages of which are, 1st. infallibly to prevent blighting, if done skillfully and opportunely; 2nd. to hasten the maturity by twelve or fourteen days, thus securing a long and excellent period for the ripening before the vintage.

There are cases when it cannot be done; two of them I shall notice; when, for instance the branch is to be trained in a spire, or bent into an arch; because the welt of bark formed around the twig is so brittle that the branch is endangered if tightly bent. In spiral-trained Vines only lateral shoots should be girdled. The second case is, when the planter is convinced that the peculiar excellence of his wine depends upon the stocks being suffered to blight; girdling must be reserved for stocks to which damping-off or blighting is ruinous.

We have many instruments good for girdling, but there is a choice among them. Some make too large a ring, which renders the healing of the cut more difficult; others are apt to become clogged every minute and must be cleaned out with a thin blade, which causes delay. The best are those which assist to effect it speedily and without risk. The cutting nippers (pince incisive) of Bettinger. and the girdler (bagueur) of Quentin Durand are of this kind, (figures are given of these instruments in the plate.) They are calculated to loosen the skin and the pellicle, but require a careful workman. If any of the pellicle be left, the sap continues to run; if the cut goes too deep, there is much danger of the branch being ruined; therefore, these patent instruments are highly necessary.

CHAPTER XVI.

OF GRAFTING.

A well planted vineyard lasts from fifty to sixty years, often longer, and during all that time bears well, if properly attended to. But it is not in full bearing until the sixth or even the seventh year. This inconvenience, which falls heavy on the planter, is relieved by grafting.

If through any negligence or ill habit, the Vines begin to languish, and make no adequate return for the care of their cultivation, it is in that case best to resort to grafting. Indeed if we consider the trouble of replanting, of grubbing out old stocks, of the long and arduous attention already spent on each stock, any means that will prolong the existence of the plants is worth attending to. In certain districts of the departments of Bouches-du-Rhone, Gironde, Cote d'Or and L'Yonne, grafting is much in use and very generally liked. I have understood that it is practised at Vevay in Ohio, where a good wine is raised by the emigrant Swiss.

The principal aim of grafting is to renew the Vine the same season that it meets an injury from frost or drought; or to substitute to a poor plant, a slip of a better quality or different species. Grafting, also, as is well known, has a remarkable power of ameliorating the nature of the fruit. It is a very ancient art; when applied to the Vine it is easily done, and its success certain. The sap of the Vine ascends by all the capillary vessels indifferently, without any distinction between the liber, cortex or wood; a particular in which it is very different from such plants as have their conduits of the sap exclusively between the wood and the bark. This peculiar contexture of the Vine fits it for slit-grafting through the whole of the wood. It is unimportant whether the scion be inserted vertically or slantwise; the wood unites to the wood no matter in what way they are joined. The slit soon fills up, and does not canker as grafted trees usually do.

Grafting, it must be said, is only applied to thick large Vines; it has been discovered, at least so the Vine-growers of Marne insist, that it does not agree with slender ones.

For grafting the Vine, the thickest and strongest lateral wood must be taken; if the cuttings are of thin twigs they will be likely to wither with the sun and wind. The foot or lower part of a cross-shoot, where there are two or three eyes, very close together, is the kind most likely to succeed; the wood in such a specimen is solid, fibrous, thick; and the circulation plentiful and free. These grafts must be cut before hard frost, tied in bundles, and put away in a cellar or vault, or under loose earth.

There are several kinds of grafting used for Vines; shoulder-grafting succeeds well on old stocks; so does budding, or insertion; but the most common are slit-grafting and tongue-grafting: latterly escutcheon-grafting has been much used in spring before the ascent of the sap. Grafting by approach also will succeed; but the most favorable of all methods is crown-grafting on the root.

Grafting on the root is the best of all; but I should first remark, that in some circumstances, grafting should be performed on the stock; for instance, when it is wanted to have from one plant that is thriving, others of the same kind by layering, to fill up empty spots. The scions to be used in grafting, are to be cut before the sap ascends into them. It is best to gather them in the fall, and bury them for six inches of their length into loose mould, secure from frosts, and the earth be dampened sufficiently to prevent them from drying away. The same precaution must be used with cross-branches cut in the spring, before the ascent of the sap. But the best time for gathering the grafts is just after the fall of the leaf. A vine-dresser with proper foresight should always have such in reserve, that they may be ready in the spring if wanted. If no grafts are needed, these same scions can be planted out to take root, and provide nurseries of slips.

The graft should comprise both yearling and two year old wood; the former should be 8 or 9 inches in length, and the latter, which is to form the wedge to be inserted in the root, should be 3 or 4 inches in length.

Before undertaking the operation, the Vine should be allowed to exhaust the first access of the sap, which is so overflowingly abundant in the first fine spring weather; because it is rather distilled water than juice, and the quantity would be likely to drown the grafts. It is therefore more prudent to wait, as is commonly expressed, until the Vine has done weeping, at which time the buds are so far evolved as to show the leaves. The sap has then acquired a consistence sufficient to agglutinate the graft to the incision, and the grafts having been cut before the rise of the sap, will not have budded, and will be the more ready to suck the sap and set in motion the circulation that is to cement them to the Vine.

When speed and economy are to be consulted, two men and a child ten or twelve years of age, are necessary. One lays bare the stocks with a hoe to the depth of sixteen inches, and cleans them sufficiently of the earth around for the ingrafter to work at his ease. One of the workmen saws the stems about six or seven inches below the level of the ground; while he is thus employed on the first row, the ingrafter shapes his grafts and arranges them, as fast as he fixes them, in a basin, in which there is enough of water to cover entirely the wedges or inserting-points of the grafts; these points must be three or four inches long, and as slender as possible. The sloping of these wedges, in other words their trimming, should commence immediately below the joint or knot by which the two-year-old wood is attached to the yearling wood.

The first row being dug down and sawed, the ingrafter, with a very sharp grafting-tool smoothes the sawed part of the root, makes the slit, and inserts one, two, or three grafts, according to the strength of the root, and in such a way as to make the separations between the grafts as small as possible. It is even more easy and certain not to insert the third graft until after the ligature has been put on. The ingrafter is followed by the child who hands him the knife, the grafts, or the strings, or osier, as they are wanted. The child carries also a basket filled with short mould. The ligature being tied, the ingrafter lays on a good handful of the mould from the basket, and fills the hole up with the loose earth around, leaving only two eyes of each graft above ground. After this, there are no precautions necessary save not to derange the grafts during the tillage necessary in the vineyard. Women should not be allowed to enter it, lest their clothes might brush the loosely fastened scions. The tillage should not be very deep; nothing more need be done than simply to clear away the weeds by slightly raking the ground. In striving to do more there is a danger of disturbing the new roots that are forming and shooting from the grafts at their insertion.

An expert ingrafter may operate on two hundred Vine roots and more, in the course of a day. In many districts, the Bordelais especially, the workman is paid three francs the hundred for all that take.

Vegetation is not very obvious upon them until the month of July; but then the shoots sprout with a surprising rapidity; and if the eyes above ground were really good buds, they will bear grapes which will be ripe in time for the vintage. Large props should not be put down beside the grafts the first year. The purchase they give to the wind causes a shaking of the ground, that puts back the roots. Slender wands a yard long are quite sufficient for props. If the shoots

exceed that height, care must be taken to top them down to that measure during the summer.

To succeed well in grafting, only such species should be joined, as are analogous in their fruit and the texture of their wood. Those kinds that bear thick strong stems will never thrive on stocks of frail and slender branches; but those varieties that have long delicate stems will become more vigorous and productive if grafted on those having a coarser, stronger sort of wood. But the white kind should not be crossed with the red; the grape only leses by it, if intended for wine; at least the red grape does.

There are many species that are ameliorated by grafting, made to bear choicer fruit and also in greater quantity. And all kinds that will not thrive in the soil, by being inserted into roots that do succeed in it, flourish without difficulty.

Calm clear weather is the only time for grafting. If a heavy rain takes place after it, there are many chances against its ultimate success. Then the superabundant moisture makes the sap watery, and too thin to cement and agglutinate the scion to its new root. As soon as the grafts do take they must be freed from the weeds. The topping of the shoot also, should not be forgotten.

CHAPTER XVII.

OF LEAFING.

Leafing helps the crop and the vine; the former it renders more flavorous and rich, and the latter stouter in the wood. It is done in the following manner. The day before undertaking the second tillage, which is generally done in June or July, according as the weather is more or less favorable, a workman who understands pruning is sent to remove the large leaves from the lower and middle parts of the stock. He then trims from the end of the main-stem, the sprigs and small laterals which have sprouted out there in consequence of the great flow of sap, and allows to remain at the head of it, only the large leaves belonging to the eyes and sub-eyes of two or three shoots. There is no need in doing this, for the use of any instrument; the fingers are sufficient for lifting the leaves; but, immediately after the first tillage, care must have been taken to cut away below the ground, those scions to the origin of which the pruning-knife could not reach. It is known that the more surface is presented to the air by the vine, the more moisture it absorbs; which, if it is more than can be transpired, liquefies the sap, and makes the wine watery and liable to spoil. Leafing, therefore, by diminishing the extent of surface, makes the sap richer, the grapes more bulky and the wine more alcholic. Besides, it throws the action of the sun upon the fruit, forcing the juices to become more elaborate and perfecting the ripening to the most desirable degree.

Those cultivators who leaf their vines assure me that they are less injured by storms; less given to blighting; that the fruit is evidently enriched, and there is every argument in favor of the supposition, that it will lengthen the term of life for the plant. But it must be remarked that all this is meant for such vines as are growing in moist and heavy soils; in dry earths and warm exposures, leafing is hurtful. This is an observation that has not escaped the notice of Theophrastus. In Calabria, and more particularly near Reggio and Scylla, far from removing a single leaf, during the great heats they protect the vines with a matting of ferns, lest the fruit should be wilted and stinted by the burning of the sun.

BOOK SECOND.

DISEASES AND CASUALTIES TO WHICH THE VINE IS LIABLE: WITH THE MODE OF PREVENTION & CURE.

CHAPTER I.

OF FROST.

As the Vine is a native of warm climates, frost is the most likely and the most common enemy it has to encounter. It is the early fall frosts that disorganize the shoots not yet completely hardened into wood; the greatest ravages are caused by these late attacks, which result often in immedicable injuries to the fruit-bearing branches. Hard winter frosts are by no means as dangerous; they never, at least in France, hurt any vines but those in low grounds and cold soils. Nature has supplied the bud of the Vine with a species of downy covering, and as it contains scarcely any watery secretion it has not much to fear from the cold. It is an extremely rare case for the Vine to be frozen entirely; when it is only the stems that have suffered, they are pruned just before the rise of the sap. Spring frosts, sometimes, have serious consequences when they are very heavy and very late; more generally, however, they have but a slight effect upon the shoots.

To prevent the all-important shoot from being nipped by the frost, the Vine-dresser follows this plan. He puts between the rows, and along the edges of the vine-yards, on the windward side, heaps of dry grass and dead leaves, litter, spoiled hay; these are covered over with wet brush, and a little earth; and are set on fire an hour before sunrise. The thick smoke intercepts the rays of the sun, warms the air, and melts the frost into dew. This is the means used on the

banks of the Rhine, where the north wind blows severely; and if it were not for this cheap and simple remedy against frost, there would be little chance for the hope of the vintager in that quarter.

Another means recommended, is sprinkling before sunrise by means of an engine; or the use of certain *frost-conductors*, invented by M. Bienenberg, cultivator at Lignitz, in Siberia. The inventor assures us that he has derived great advantage from them on fruit-trees for several years. His frost-conductors are made with ropes of straw, or hemp, or bark; he winds them round the trees and coils the other end at the bottom of a vessel filled with spring water. A single vessel is sufficient for all the trees of a large espalier. Several of these ropes may be put together to surround a definite space, but then both of the ends must be led to the vessel, which should be at least 4 or 6 yards distant from any tree, on account of the frost deposited in it, and which, if too near, would strike back to some of the ransomed trees. This singular preservative is used in several parts of Prussia and Poland. Instead of moveable vessels, stationary reservoirs might be put down with small expense, along the borders of every vine-yard. It is an experiment worth trying on a large scale.

2. *Of Hail Storms.*

Next to the injuries of Frost, may be counted those of Hail; a single shower of which, in spring or summer, is sufficient to destroy the hopes of the whole season. The hail tears the leaves, bruises the shoots, breaks the stems, in fine, covers the whole vine with wounds and hurts, and gives it the most dismal aspect. The only thing to be done is to wait until the dreadful gust has passed, and immediately prune the plant to re-establish it. The cutting should be made on the old wood; only a few main-branches, and those cut short, are to be left. All the condemned shoots must be cut away clean to the branch. Not long after, the stock sends out a new crop of buds, which give grapes the following year, and indemnify the owner the third year by a most luxuriant vintage. Those who will not take the pains to do this justice by their vines, have scarcely crops worth the name, even at the third year.

However, if the hail storm happens after the middle of July, it is better to remove the wounded wood and no more, for there is then but little to be gained by severe pruning. In the greater number of places, the wood, from that time, will not have a chance to ripen, and of course will be destroyed by the first winter frosts. But the hail

rods, (*paragreles,*) invented by *M. Lapostolle* of Amiens, and brought to perfection by Professor *Trollard* of Tarbes, are the only proper preventative of the damages of hail. To make the hail-rod, a rope of straw is the first thing necessary; it must be made of ripe rye or wheat-straw, soaked and twisted, then plaited with three strand, and then plaited with four ply, making twelve strand to the rope. This cable of straw must be 25 feet long, and through the centre of it there must run a strong twine of tow yarn of twelve or fifteen strands to the twist; and it must be fastened at top and bottom to a stake of the same length, solidly fixed in the ground, and armed at the top with a metallic point of latten, (tin,) *and not of iron.* The stake should be a pole of firm wood, entirely cleared of the bark which makes it liable to rot. The rope is fastened at each end by a wire of tin or what is better, red copper; and must be stretched tight and tied to the pole at every foot and a half with the same wire. The tin point at top should be 1½ inch. thick and 8 inch. long, and be in direct contact with the tow-yarn. These hail-rods should be about 600 feet apart, and fixed in the most elevated points, such as the tops of hills, the roofs of houses, or the trunks of stout trees. Among us they cost about a franc a piece, (20 cents,) and last at least fifteen years. Public experiments, on a very large scale have been made with them in several districts that used to be incessantly afflicted with hail storms, and the most unequivocal success has been the result. To prove, however, how error and deception forever are at hand to pervert all human undertakings, we may make the passing remark, that several learned men have opposed the authority of their names, well known in science, against this discovery and endeavoured to explain away its utility by any and every accidental cause. But the fact is, that the cantons in Italy, Switzerland and France (vide Linnean Annals,) which are guarded with hail-rods, find the clouds that used to break over them with desolating hail and thunderbolts, now pass away or descend in in rain. The principle on which they act, is thought to be, by their attracting and detaining vapours in a lower region of the air than the one in which frost is formed.

Of Fogs.

Fogs are less hurtful to vines that is commonly thought; they fertilize when they happen during tillage; in autumn they assist the ripening of the grape; but if they last too long, they rot the berry; and cold mists render the plant more susceptible to frost and dispose

it to blight in the Spring. The skill of man has never yet discovered either remedy or preventative to this surcharge of moisture in the atmosphere and its effects.

4 *Of the Flush or Plethora.*

This disease proceeds from the too great abundance of nourishing juices that are afforded to the plant, by a hot, deep soil. It only happens in those excellent and heavy bottoms in which the lower layers are richer than the surface. It shows itself firstly by the vines, sprouting jets and spriglets at every joint, at the expense of the fruit, the most of which dwindles away; the wood swells and reddens, and preternaturally thick; it is full of buds and eyes, and becomes brittle. At first, of the berries that ripen, some are enormously large, others of small, irregular sizes; but in a season or so, the grapes become dwarfed and are not bigger than small peas. The Gamet and Melier kinds are most liable to this distemper. The only method is to tear up the diseased stock; to dig deep and lay open the soil that it may mellow freely; to open trenches to isolate and confine the roots; to replace the earth taken out by worn out, washed soil, sand, moor sods, &c.; and to set out a new slip and not plant it deeper than 6 inches.

Of the Goupillure or Stint.

This disease is owing to a soil too poor, the deceitful surface of which has induced the planter to set out, while the bottom is only of clean sand. It rarely shows itself until ten years after planting, and just after a remarkably fine vegetation and crop; but it then is irremediable The plant having then sprouted its roots to the uttermost, without being able to obtain the aliment it seeks from the sandy substratum, pines, and grows feeble, gives a meagre crop, and instead of sprouting its leaves in an oblique direction, they stand horizontally. There is no cure, the stocks must be grubbed out.

A complete knowledge of the nature of the ground chosen for the vine-yard, is the only safe-guard against the invasion of this complaint. In such soils as will produce it, the only way is to plant no deeper than 9 inches, and in the fifth or sixth year to intrench the stocks; the roots then must run near to the surface and keep deriving their sustenance from the layer of good earth, without piercing deeper.

6. *Of the Mildews.*

This disease does not, in the least, resemble the mildew of wheat, it should rather be termed a *palsy* of the vitality of the plant, which, in fact, is the name given it in several places. It is caused by an unremitting excess of moisture, damp, or humidity around the roots, or kept up around the plant by evaporation; it shows itself by the diluted vigour of the sap, which runs all to wood; the stems are blackish and dry to the pith. It generally strikes newly planted slips that are set out in an improper situation.

7. *Of Cankers.*

Cankers often happen to the branches; they may originate in some internal cause not yet observed or understood; but they can generally be traced to a stroke of the sun after a frost, a hard bruise, or the touch of a heap of stable dung. In unfavourable seasons the rapidity is astonishing, with which this disease will run through its different stages; but usually its progress is but slow. The remedy is to run a knife above and below the part, around the stem, cutting through the bark and pellicle to the wood, or binding the part tightly with a string.

8. *Diseases of the Leaves.*

The Blast, the Rust, and the Yellows.

The Blast takes place in the summer, owing to hot South winds after a fog. It appears suddenly; the leaves take a red hue and two days after, fall off. The grapes wrinkle and dry up. The vine-dressers, near Paris, call it the *rougeau*, the *red plague*. There is another kind that is rarely dangerous; it is attributed to a hot sunshine after rain, the rays passing through the drops that hang upon the plant as through burning lenses. It gives the leaves a speckled appearance, marbling them with large and small white spots.

The Rust is owing to a parasite fungus, the *Erinæus* of the vine; it forms on the lower surface of the leaves, spots of a tawny colour, of irregular size and shape, and disorganizes the leaf, making it unfit to fulfil its functions.

The Yellows gives the plant a sad appearance; the wood will not become solid; the fruit is scarce worth the name, and the poor, small bunches fall off entirely. The disease affects the crops for two years. When the leaves have fallen in consequence of the Blast, a light cap or matting of straw fixed at top of the prop will, if any thing can, shield the grapes and allow them to ripen. If the Rust has made its appearance, cut the affected leaves before the seed-like shoots of the fungus have ripened, and burn them. For the Yellows, the cure is to warm the substratum if possible; intrenching is good, if no other means can effect a restoration of the plant; but the most usual and powerful means is, to turn in, around the foot of the vine, heating manures, such as kennel mud and filth, ashes, street sweepings impregnated with suds, slaughter-house rinsings, urines, &c.

9. *The Blight or Barrenness of the Blossom.*

This is not exactly a disease, but only a casualty, arising from heavy, continued rain during the flowering. The rain carries away the vivifying dust of the stamens and prevents the fecundation of the germs in the capsule. Girdling is the remedy. It may result from a cold rain or severe frost, during the blossoming, or owing to the fatigue caused by furious storms of winds; or by a thin ill-assimilated sap. The effects may be prevented by girdling the fruit-stalk in time. The strength of languishing vines may be restored by piercing the trunk, by tying up the stems, by twisting the end of the branches, or by watering the roots with diluted animal matters, waters slightly salted, or by liberally scattering over them soaked wood-ashes.

CHAPTER II.

OF ANIMALS THAT ATTACK THE VINE.

1. Quadrupeds.

Wild hogs, foxes and weasels are excessively fond of the ripe grapes. As these animals willingly return where they find a plentiful supply of enticing food, they are killed at night with guns or snares. Most other quadrupeds will eat the vine-shoots, leaves and fruit; but it is the domestic dog that makes the most incalculable ravages in the vine-yard. In several villages, and particularly at Espira de la Gli, near Perpignan, (Pyrenees Orientales,) several planters' names have been given me, who have been obliged to throw up this cultivation, on account of the depredations of the dogs, that carried away nearly the whole of their crops.

Vines in enclosures are not attacked by the dogs; they only prey upon the crops of vineyards that are open and unfenced. To attempt to poison either dogs or foxes by nux-vomica, as some planters do, is highly injudicious; cattle or children are as likely to fall victims as those for whom the bait is laid. The right way is to diminish the number of useless dogs, to oblige owners to tie up those they keep, and to use guns to get ridded of the rest.

2. *Of Birds.*

There are many sorts of birds that are passionately fond of the grape, and several of those are rendered quite luscious eating by the delicate fare afforded them in the vintage season. They should be caught with nets. The orioles and the finches are insatiable; where the vintage is late, the thrushes cause great ravages. The starlings, the blackbirds and several other birds of passage come down on the vineyards in flocks; and, if let alone, will sometimes clear the whole crop. And the same with the wild sparrows. However, their pillage

is nothing, when regulated by guns and scare-crows, compared to their services in destroying the myriads of dangerous insects, whose ravages are not easily to be forgotten.

3. *Of Snails.*

In general, snails, whether with or without shells, are not much to be feared, though they live on the leaves of the vine. But there is one kind, the vintager snail, which does severe damage in rainy seasons. In the fall it deposits in the ground a great number of eggs, which it conceals with much care; they are white, spherical, covered with a soft, membraneous skin, and united in clusters. These eggs hatch in spring, and at the approach of winter, the snails, several together, hide in holes, and keep in their shells, which they shut with a calcarious operculum, and do not make their appearance until the following spring. They work at night and eat the young shoots to the wood; in the day, when the atmosphere is dry and warm, they keep under the largest leaves.

The hedge-hog and the tortoise devour these snails; the former, if caught, is a saleable article for ragouts. The snails can be destroyed by means of powdered lime, or rather a dilution of lime sprinkled during the night, when the weather is rainy.

CHAPTER III.

OF INSECTS THAT ATTACK THE VINE.

The smaller that insects are, the more difficult of investigation does their chain of being become, the greater is the care of nature for their preservation, and the more numerous and active are their means of reproduction. Insects attack every created thing ; and there is not a plant that does not bear one or several families. Some prefer the roots, others the trunk ; some the leaves, others the flowers and fruit ; indeed there is no part of the plant which is not consumed by insects.

The Vine, when introduced from its native country, brought with it the peculiar insects it was destined to support ; and it has also made acquisitions of others which might as well be spared ; and which too often cut off the hopes of the vine-dresser, and deprive him of the dues of his cares and labours. The vine-eating insects the most troublesome in France are, the *tree-beetles*, or *chaffers ;* some kinds of *weevils ;* the red *chrysomela* and the *lady-bug* among the *coleopterous* kinds ; among the *orthoptera*, the *grass-hopper*, the red-winged *cricket*, and the *camel-cricket ;* of the *hemiptera* ; the *Chermes-vitis* or *Vine-Fretter*, of the hymenoptera, the *Wasps* ; of the *lepidoptera*, some of the *Pyralis ;* the several *Sphinges ;* the moth that attacks the berry, and the *Miner-moth.*

1. *The Melolontha.*

Of the coleopterous genus under which this family ranks, there are two individuals which are severe on the Vine, the common cock-chaffer and the Vine-chaffer.

The cock-chaffer, or Melolontha vitis, in the perfect state devours the leaves ; the larva, or *white grub* is very troublesome about the roots in vineyards newly set out. The species are abundant every where, but more particularly troublesome in the northerly departments. They also feed on the leaves of the willow, poplar, and fruit trees. The Vine-chaffer, (*Scarabeus vitis*) has but half the size of the

common beetle, and its ravages are more to be feared in the southern provinces, where its destruction is frequently great. The perfect insects can only be got rid of by watching upon what trees they take their rest for the night; these trees must be stoutly shaken early in the morning before the dew dries, at which time the insects are too weak to fly much; they fall to the ground in showers, quite motionless, and by having here and there a hole ready in the turf, and by sweeping them in with a rake or a shovel, a little straw and shavings heaped over them and set on fire destroys the pest effectually. The larvæ must be destroyed by the hoeing in May; when they may be gathered by thousands, as they, at that time, work their way up close to the surface, and are easily turned out. They may be heaped and burned, or given as pasture to poultry, fowls and turkies being especially fond of them.

Some have proposed as a remedy against the beetle and its grub sprinklings of tallow, ashes, lime, lettuce seed &c. but all these are inferior or ineffectual compared with the means just laid down.

2. *The Cryptocephalus vitis.*

Is known under a great variety of common names, Clerk-beetle for instance, from the traces like letters which it makes on the leaves which it attacks.

This scourge of the vineyards is the Cryptocephalus vitis of Entomologists. It is three lines and a half in length; the antennæ black, and yellow at the base; the head, corslet, belly and feet are black and slightly velvetish; the wing-cases are reddish-chesnut, rufous and downy.

It lives on the leaves and tender shoots; it eats the foot-stalk of the bunch, just as the blossom opens; it pierces the berry when ripe, to deposit its eggs, which give birth to myriads of larvæ, and cause a rotting of the fruit which cuts off the crop sometimes at the very moment of gathering. The larva winters in the ground, mines and countermines, penetrating among the roots, which it gnaws sometimes to the utter destruction of the plant. About the first of March the larva begins its transformation and shortly after the insects come out and couple in May.

There is no really effective means of putting an end to the ravages of this insect; the peculiar meteorological changes of the air have sometimes caused them to disappear for years. The only human resource against them is, the ploughing and tillage just before winter, which exposes the larvæ, when they may be raked out and destroyed: or the catching and killing of the perfect insect.

3. *The Weevil.*

The satin green weevil, *Rhyncites Bacchus*, is small and generally found in pairs. It settles on the young cluster, pierces the foot-stalk, takes possession of a leaf, curls it and deposits its eggs in it, agglutinated to it by some viscous matter. These eggs are about the size of a small pin's head and of a yellowish white. The larva is hatched in a fortnight; it is without feet, six lines long, white, smooth and with a yellow head. It first feeds upon the leaf in which it was hatched; and grubs in the ground or under dung during winter, until its metamorphosis in the spring.

There are some seasons in which the *Rhyncites rubens* is so plenty, that it pricks the forward grapes and sucks them, and rolls almost every leaf, which is a great injury, as the leaves are renewed at the expense of the fruit, and the bunch, deprived of its nourishment and support, wastes, wilts, and comes to nothing. The curled leaves, nets, purses &c. in which the eggs are deposited, must be clipped off and carefully carried to a distance from houses, woods, hedges &c. and there burned; and about the close of the winter, the manure, if any, around the root of the Vine, must be raised and set fire to; as it is the place of refuge not only to this, but many other grubs. This measure will make a pretty thorough clearance.

Another weevil called the *grey* weevil is highly destructive in the South. It attacks the sprouts just as they begin to unfold and prevents their full developement. In the departments of Aube, Gard and Haute-Garonne, they use against it the usual precautions against catterpillars in general.

4. *The red Chrysomela.*

This insect, the *Chrysomela lucida* of Linnæus, feeds on the Vine leaf, but the injuries it occasions are so small as to escape notice except in seasons when they are uncommonly numerous; but even then, they are nothing to be compared to the ravages of those already mentioned.

5. *The Coccinella globosa.*

The larvæ of this insect, commonly called lady-bug, eat the Vine-leaves, but they will also, it is said, destroy the *Aphides;* they are sometimes so numerous as to cover the stems; they have a horny head, a naked body and tail, annular, with six feet.

6. *The Grasshopper or Gryllus grillo-talpa.*

This voraeious insect gnaws holes in the joints of the Vines, which, if they do not kill outright, will at least throw the plant into a state of languor and debility which is finally fatal to its produce. This grasshopper, a kind of mole-cricket, cuts the roots that lie in its way and makes an active chase after other insects which it greedily devours. The best means proposed to destroy it, is to keep the soil moist; but then it does not agree with the Vine. It may for a time be the lesser evil of the two.

7. *The Mantis religiosa or Camel-Cricket.*

This insect is falsely accused of more injuries to the Vines than it in reality commits. It is only in the larva state that it feeds on the tender leaves. In its perfect state it lives on insects; it catches them with singular address; and in eating, always commences upon one end of the abdomen.

8. *The red-winged Cricket.—Acrydium stridulum.*

The extremities of its red wings are black and folded lengthwise under two coriaceous sheaths. The corslet is ridged and the hinder legs are formed for leaping. It eats the leaves; is very voracious, and its prodigious fertility make it formidable at times. The female lays her eggs towards the close of autumn, in the cracks of fat soils, where they remain until the first fine day in spring. By the end of May the young crickets come forth; they are not winged, and cast their skins several times before the perfect state.

In our northern departments they are not numerous, and are caught in nets; but they infest the South in some seasons to that degree, that they have to be routed like armies. The starlings and some other birds are fond of them.

9. *The Chermes vitis or Vine-Fretter.*

Commonly called gall-fly; it is brownish, and settles on the trunk and branches of the Vine, where it lays great quantities of eggs which it protects with a light covering of white down from its body.

The eggs are reddish, oblong and shining; the young insect does not pass through the larva state, and is of a light brown colour; the greater number are devoured by another insect called *ichneumon coccorum*. Those which escape this enemy mostly attack the trellised or arbour Vine; the sap of which they so exhaust as to cause the death of the plant, if their number is great. They adhere so firmly to their hold, that to clear them, a knife must be passed between them and the bark, a very delicate operation, which must be performed with great care.

10. *The Wasp.*

This insect attacks the very finest sorts of grapes; thus the Musk-Chasselas, from which the Grenache wine is made is, its favorite. It pierces the epidermis, insinuates its trunk and sucks away the saccharine mucilage to such a degree that the skin is often left a mere empty shell.

But it should be told, that if the wasp does select the ripest grapes, the berries it has pricked always contain less fermentable matters and thereby influence the quality of the wine.

11. *The Pyralis or Silver-Moth.*

The male caterpillar of this kind commits great ravages in the vineyards of the black Morillon. It is nearly two inches in length, with sixteen feet, the head black, and smaller than the body, which is ferruginous and composed of six rings with here and there a few hairy moles. Its mouth is armed with nippers that cut the leaves, stems, footstalks and epidermis of the berry. The injured parts gradually dry, and the caterpillar then spreads over them some very slender, white silky threads. In this manner it makes a lodgement in the flower or on the fruit just formed, and blights the crop. It comes out from its cell at sunset, or sooner if the day is dusky, especially when it is rainy, but it does not journey far. In one month the larva assumes the chrysalis state and its white cones are mingled confusedly with the remnants of the withered flowers and husks of the berries. In a fortnight the phalena makes its appearance; grey wings, striped with black; the body yellow and velvetty; and the antennæ slightly pectinate.

This night-butterfly places its eggs in the woody fibres of the stalks

from which, early in the spring, the caterpillar comes out. In hot seasons it does not do much damage; but in rainy ones it creates severe losses.

Roberjot, who was assassinated at the congress of Rastadt, cleared the Maconnais of the Pyralis which infested the rich vineyards. by burning for an hour at night-fall, on the heights in the vicinity of the vineyards, fires of straw, litter, small faggots &c. The phalena are attracted from a great distance; and thus with a few cents of expense millions of these hurtful creatures are consumed. These fires attract not only these, but all other night-flying insects, the larva of which is hurtful to fruit and forest trees. These fires must be so stationed as to cause an eddy of the smoke and flame. From the first of July to the fifteenth of August, according to the locality, is the proper time for this to be done; and when once begun they must be continued for ten days together until the weather is suddenly cold, or rainy, or windy, at which time the insects cannot be tempted to fly.

12. *The Tinea or Miner Worm.*

Is rife in southern vineyards; the larva is very small; and harbours and feeds between the upper and lower skin of the leaf, where it eats out long galleries. When the time of metamorphosis approaches, it cuts two very thin pieces of epidermis, oval and perfectly alike; it glues them by the edges with its silk, leaving one end open; and as its body is only composed of close rings, it has recourse to skill to move itself, even over smooth surfaces, to a place of security. It comes out of its cocoon, and fastens down a little heap of silk; to this it attaches a thread by which it draws up its house and itself; this process it repeats until it has reached its destination; and its place of retreat is discovered by the clue of silk which it has left on its track.

The Miner worm is less destructive than the moth-caterpillar; it is eaten besides by a red ichneumon spotted with yellow, which pierces the body of the caterpillar and buries its eggs in it, which when hatched, nourish themselves on the juices of the Tinea.

13. *The Sphinx.*

The larvæ of the *Sphinx elpenor*, *S. celeno*, *S. porcellus*, devour the leaves of the Vine; but they never appear in great numbers and their injuries are not much felt. The caterpillar of the *S. celeno*,

is brownish, with eyes on the sides of its neck, and two white lines down the sides. In July and August it feeds, and in a month curls some leaves, glues them in a spire and becomes a brown chrysalis darker at one end than another.

14. *The Tinea of the Cluster.*

This larva is naked, red, with sixteen feet and is called by the vine-dressers' Vine-worm. It feeds in the inside of the berry. In October it eats the grape-stone;—the berries thus injured detoriate the wine, as they are entirely deprived of the saccharine principle; this requires the greater attention on the part of the vintner to clear out such injuredgrapes, as it is difficult, if not impossible, to destroy the insect.

BOOK THIRD.

THE ART OF MAKING WINE.

CHAPTER I.

OF THE VINTAGE.

The art of making wine comprises a long series of operations of different degrees of delicacy, but all of equal importance, in consummating the article to a degree of excellence and durability fit for the purposes of commerce. Two faults in the fixing of the time for the vintage may be noticed; the one when from a fear of the grapes being robbed, they are gathered before they are full ripe; the other when they are left to hang too long, which makes the wine weak, hard to clear, and very apt to be full of phlegm.

The mark of the proper term of ripeness, is when the pellicle is thin, transparent, and does not yield short to the teeth; when the colour is at the deepest; the white becoming grey, the reddish purple deep black; when the stem of the bunch is dry and woody, and the colour brown like the bark; when the cluster depends, hanging downwards visibly, for the maturity increases the weight; when, which is an unfailing sign, the berry comes off with a touch, leaving on the stem a transparent blob of the pulp, of a winy colour.

This term is generally waited for in all the south of France; but in the more northerly parts, where the early frosts of September and October are much to be feared, they gather earlier. Dead ripe black grapes may, in extreme cases, be left to the attacks of slight frosts; but if unripe, a frost does them great injury: there will be a loss of one fifth in the quantity of the wine; and it will be weak, pale, and apt to sour and turn ropy.

The vintage should take place of a fair day, and when the sun has dried the dew. It must be done with the greatest activity and despatch, because dry sunny weather at that period of the year is variable. If rain comes on, the vintage must be put back; the delay of a day or two is better than to manufacture, from wetted grapes, a wine that will not keep. Grapes gathered during a hot and dry time, or at a middling temperature, ferment the quickest and strongest.

To gather the fruit, some use a pruning hook, or knife, others their hands, and the greater number, slender shears. The pruning hook is wholly unfit; the instrument is clumsy, and in cutting the stem of the bunch, the plant necessarily suffers a shock which makes the ripest berries fall, and also dried leaves, which soak up the juice, diminish the quantity of the must and communicate an acrid savour to it. The pruning knife gives the plant a still stronger shake. The abuse is even greater where the vintagers are allowed to use their fingers; the stem rarely breaks at the first pull; and when repeated, the jerk it communicates to the branch, rains down berries and leaves over the whole ground. The only advantageous way is to use a very long, slender pair of shears, which divide the stem with care and occasion no loss.

The vintager's basket should be small, and he should lay the bunch in it as lightly as possible, for fear of bruising the grapes. In large baskets, the fruit is heaped and crushed, and the richest part of the juice runs to waste. A deep basket, holding two pecks, narrow at bottom, and gradually spreading broader to the brim, is the proper kind. This shape allows the weight of the fruit, instead of resting on the bottom entirely, to fall more on the sides of the basket, which prevents the crushing of the lowermost bunches. The vintager, as he cuts, should pick out and throw away the dry, rotten, or green berries. The dried berries soak up the must and give out an acid taste; rotten grapes ruin the wine; the green ones give a harsh rough taste, and make the wine likely to sour. If such grapes are not picked out, there will result, among the other evils they occasion, an unequal fermentation of the saccharine and aqueous matters and a striking detoriation in the quality, which cannot be masked. The fruit is transported to the wine vats in waggons, or on the shoulders of men, or in panniers slung across horses. The gatherings of each vintager are removed into larger willow baskets, or into barrows expressly for this use.

The custom of using willow panniers is none the better for being the most ancient known; owing to their elasticity the slightest movement causes the fruit to sagg and the skins to break, consequently the

juice is constantly leaking. The waggon jolts too violently to be a proper means of carriage; wooden barrows transported by men, or by horses or asses, carry the grapes to the vat, without loss, or bruising or overheating. The grapes *de la Marne* (for Champagne wine) are deposited in broad baskets slung across horses; the baskets are carefully covered with large cloths to keep off the heat of the sun and prevent an untimely effervescence.

A careful vine-dresser therefore will have the vintage only undertaken in fine weather; he will allow no awkward vintager to endamage his crop; he will hire labourers enough to finish the work in one day; he will superintend the work himself, with the assistance of a strict and able overseer; he will have the stems of the bunches cut as close to the cluster as possible; he will require his vintagers to pick out and throw away the rotten berries, and to leave on the plant the unripe bunches; he will supply them with small baskets only; and will see that the clusters are removed into the panniers gently and with due care, and transported to the press by horses or carried by hand.

CHAPTER II.

OF STEMMING THE GRAPES.

Vine-dressers are still divided on the question whether it is better to remove or to leave the stems of the bunch in the press. Rozier recommends stemming; and owing to him it is universally practised in the neighbourhood of Lyons, and particularly in the famous vine-grounds of Ampuis and St. Cyr. Near Bordeaux they carefully stem all the red grapes from which they wish to make a better wine than common; and it is generally done, also, wherever pure, superior wines are wanted.

The authority of the celebrated Rozier, and of the vine-grounds mentioned seems beyond questioning; and yet the stemming of grapes has had to be given up in the Orleannois and all those districts which do not raise sweet grapes. Experience goes before science, says Bernard de Palissy; the facts are such, and science has resolved the problem.

We now therefore know that stemming is proper in the South, where the wine is rich and generous; while in the North, where the wine is weak or insipid, in seasons that the grape is very ripe and juicy, it is better not to stem, or if it is done it is better to spare the stems of at least part of a the crop.

The stem contains an acerb astringent principle which renders the wine rough during the two first years, but contributes to its preservation. This principle corrects the weakness of the must, and facilitates the fermentation according to the temperature of the year. It then becomes an agreeable quality, and by increasing and heightening the flavour of the wine, adds to its value.

There are several ways of stemming; the readiest and easiest is that practised in the district of Besancon. A large vat is constructed, ten or twelve feet in circumference, or 3½ in diameter by 2½ feet in height. On the inside, about ten inches below the rim of the staves, there are three brackets to support a false bottom; this is made of three or four pieces of plank [fastened together by two cross-pieces nailed athwart,] shaped round, to fit close in the vat. It is pierced with holes large enough for two or three grapes to pass at once; and

the holes so close that it is a perfect riddle. The false bottom can be raised or put down by the hand, if made properly and not too tight. The stemmer throws in upon it several clusters, and shakes and rubs them in all directions until the stems are left bare. He puts in but a few clusters at a time, that the grapes may escape the more easily. A handy workman will clean by this means from 1000 to 2000 gallons in a day.

In some places they make use of an instrument like a hay-fork, which the workman shakes and moves circularly in the vat among the grapes. By doing it very rapidly, he removes the fruit from the stem and collects the stems at the surface, from which he removes them with his hand. Some also stem with a common willow sieve, the bands of which are from 3 to 3½ inches apart, and the brim plaited uncommonly thick and strong.

White grapes ought not to be stemmed; it is observed that wine from such is less alcoholic and more apt to become turbid.

CHAPTER III.

OF THE WINE PRESS.

The Grecians, before putting the fruit into the wine-press, used to spread it on a frame and expose it to the sun for ten days; it was then kept five days in an airy, but shady place, to ripen it and make it sweeter, say their writers. The operation is in practice to this day in several isles of the Archipelago, and also in Spain, especially near St. Lucar; in parts of Italy, for instance Calabria, and in some of our North-eastern departments.

The crushing of the grape assists fermentation. It is generally attended to as the vintage arrives from the vineyard. What is mostly used for this purpose are square boxes open at top and pierced at bottom with holes, into which a workman gets, who is shod for the purpose with large wooden clogs or stout shoes. He treads and stamps as fast as he is able. The expressed juice runs into the vat below; and when all the berries are mashed, he either throws the murk into the vat, or on one side, according as the murk is to be fermented with the must or not; and then recommences his tramping.

In other places they press the grapes in troughs, which is more suitable; or they wait for the vat to be sufficiently full and then send into it two or three men, naked, who tread the grapes with their feet, and squeeze with their hands those that swim. These methods are dangerous for those who tread, and are also imperfect, as much of the fruit remains entire; the fermentation must be carried to the point of bursting these berries, which delays the general fermentation and is contrary to the principle that it should proceed uniformly.

To remedy these inconveniencies, *Parmentier* recommends the mode in use in the Vine-grounds of Champagne;—to select the bunches that are entirely ripe; to transport them carefully to the press, and arrange them without bruising on the press, and then to lower the screw. But this method is tardy, and when the grape has a hard skin, opposes too great a resistance. De Bournissac and Gay of Montpellier (see Bulletin de Pharmacie, tom. IV. p. 411 and 558) have invented a press that is much too expensive; a cabinet maker of Castres, one *Guerin*, has invented one much simpler, which is

thus spoken of in the Agricultural Transactions of Toulouse. "This machine works by two wooden cylinders, [at the bottom of a hopper] turning in opposite directions by means of two toothed wheels. An experience of five years has tested the machine and shown its economy and perfection." It costs from 70 to 84 francs. I may as well also notice one to which I myself gave the finishing hand. The first idea belongs to *J. J. S. Acher* de Chartres; its merit is its cheap construction, and its affording every advantage required. It is about the height of a man; and consists of a wooden frame, from which is suspended a hopper, into which the grapes are flung, and one side of which is continued down, projecting out, with guards on each side, and forming an open gutter or slide. The hopper is closed at bottom by a cylinder garnished with large, flat nail-heads, and provided with a handle; a man stands and turns it with ease; the cylinder is 3 feet long, and one foot thick; in front of it there is adjusted a comb of iron nails, which work between the nail-heads on the cylinder and clean away obstructions. There is not a single berry that escapes, and the juice, skins and stones flow down the open slide into a tub, which is moved away as fast as filled.

The operation of crushing must be perfect, and every grape in the vat ought to go through it, to make a complete, finished wine; the above machine is so simple and easy of construction that any vine-dresser can provide himself with one, and by the equal and simultaneous fermentation of the must, have a chance to rival the wines of price, for which no pains or expense is spared in the pressing.

CHAPTER IV.

OF THE VINOUS FERMENTATION.

Every farmer of the least care will have his vats cleaned out with the greatest attention before the beginning of the vintage. Some rub them with very ripe Portugal quinces; others, if the vats are of stone, give them several coats of quick-lime, to destroy the malic acid in the must. If the vats are of wood, some wash them with warm water; dry them and pour brandy down the sides; others rub them with decoctions of aromatic herbs, with salt and water, with boiling must, &c. All these methods are good, when cleanness is the result; but quick-lime has, I fear, some inconveniencies; the calcareous salts formed by this application, by mixing with the wine may communicate a bad taste to it, and properties injurious to health.

The quickest fermentation is the best; to make sure of it, a vat that is begun must be filled on the same day; the grapes also are not to be carried to the vat until towards ten o'clock, or even noon, so that the heat of the sun may warm the must. If it is foreseen that the vat cannot be filled in twelve hours at furthest, the vintage had better be deposited carefully in puncheons, and the pressing be deferred until next day. It is unsafe also to have vats of too great a size; because in cold seasons, they are harder to heat, and more difficult to fill, and the wine is apt to lose its bouquet in them. The farmer who can master these objections does well to prefer the large vat, because the fermentation is always more active in a large body of must than a small one.

The presence of sugar and water are not alone necessary for fermentation; heat also is required up to 12 degrees of Reaumur at least. To this effect several gallons of the must are to be heated in kettles, and poured into the vat. One precaution must be remembered; the must is to be removed from the fire the instant it has reached the boiling point, or it will acquire a sweetness that will make the wine unfit for keeping. If the vintage has taken place during a very warm spell, or even during a middling temperature, the fruit will contain heat enough, and no external assistance be required to promote the

fermentation. If the crop is not as sugary as usual, owing to a cold summer, a half pound of brown sugar must be allowed for every ten barrow-fulls of grapes. The must also may be scented with the young sprouts of peach or almond trees, and some few handfulls of dried elder-flowers. As soon as ever the vat is filled, the whole mass of juice must be stirred up briskly, and covered down with a lid or cover, or boards, laid over it.

In a few hours the fermentation is in full train; but sometimes it is delayed for several days for want of the contact of the external air. When fermentation begins, the substances become troubled, displaced, and effervescent, as if about to separate. The heat rises to 20° of Reaumur; the liquid swells to a greater volume; then, much carbonic acid gas is evolved, and the wine is made. That gas once let loose, the stir is appeased, the liquid falls, grows cold, the foreign substances precipitate, and the wine becomes a limpid fluid.

All enlightened practice proves that air is a vehicle necessary and favorable to fermentation; and that if preserved from the contact of the air the must can be long kept from change or alteration. But the experiments of some chemists prove that although the must in tight vessels goes very slowly through the process of change, it nevertheless does become wine, and that of a very rich kind. From which arises two doctrines concerning the making of wine, one that it should *ferment quick*, the other that it should *ferment slow;* the one declaring that atmospheric air aids the process and assists in carrying off the gaseous matters which must disengage themselves from the liquor, to perfect it into wine; the other insisting that wine fermented beyond the contact of the air is richer, with more bouquet and more alcohol, which the carbonic acid gas carries away where the fermentation is open. The difference of these two parties is mostly in words; and the gordian knot is easily unloosed. To make good wine there is one ferment with agitation required, which, to be complete must go on quickly; and needs the contact of the air to evolve it thoroughly. The term of this ferment is the *sinking of the scum* or head. Then comes on the second ferment, which is slow and progressive. This is the time to close the vats so close as only to leave issues for the carbonic acid gas to escape.

Modes of making wine differ according to the quality or species of the grape, the nature of the soil of the vineyard, the temperature the latter enjoys, and even we may say, according to the notions of the vintner. In some districts the wine only remains in the vats from 36 to 40 hours; in the neighbourhood of Lyons, it is left from 6 to 8 days at most: in many places the term is usually from 12 to 20 days;

in the Southeast departments it remains 25, 30 and 40 days; at Narbonne it is sometimes left 70 days. If you ask why, when the fermentation is over, and the wine is made, it is thus left upon the lees to clarify in the vat, the answer is, *it is the custom;* if you say that there will be great loss, that the head will grow dry and sour, the answer is still the same.

When the fermentation has gone through the necessary degrees, and the suspended residuum has been expelled to the surface of the fluid, forming the chaplet or head, as it is called; if there is heat enough in the vat to harden the upper part of the head, and procure a certain siccity which makes it like a crust or solid substance, and if some oily or resinous particles float upwards and make the head compact and closely adhering to the sides of the vat, there is no reason why the wine may not be left untouched. So long then as the wine is covered from the air, and there are no openings to favour the evaporation of the alcohol, the thick head serves as well as any lid to protect the fluid beneath. And if the head is so firm as to remain in its place notwithstanding the falling of the wine from the *slow fermentation*, the wine beneath will be better than any of the same crop that has been exposed to immediate racking off. However, no wine can remain without injury 30, 40, or 70 days in the vat, without being a bad wine, and the vat too warm. I say a bad wine, because it must be wanting in the saccharine phlegm that holds in solution, or serves to incorporate, the aqueous part with the oily and resinous ones. When this tract or mucilage is plentiful, it will absorb and keep back those oily and resinous particles which must rise and cling to the scum to preserve the latter from mould, and make it fit to protect the liquor from the air. If the warmth of the vat is great, it attenuates these oily particles and the head becomes porous or filmy, unfit to shelter the wine, and acetous fermentation begins. On the other hand, when the phlegm and spirit are in an uncommon proportion, they make the insensible perspiration so brisk and tumultuous, that the heat evolved draws from the head a carbonic gas with which the wine becomes charged, and is in consequence, harsh, hard and heady, as dangerous for use as it is unpleasant to the palate.

But wine in France is mostly fermented exposed to the air. The custom is rendered respectable by experience, and by the wisest cultivators and farmers who reason on all their customs and all the traditions that guide them. I have therefore no great idea of the new method known by the name of the Elizabeth Gervais' Patent, and

which seems to have been borrowed from my late friend *Fabbroni** or *Don Casbois* of Metz, who constructed in 1782 an *hydraulic valve*, of the same characters as the *wine-making apparatus* of Gervais; or from *Goyon de la Plombanie*, who in 1757 described an analogous process; or from the Neapolitan *Porta*, or the German Chemist *Becker* who lived in the beginning of the seventeenth century. The new invention is intended to prevent the escape of the spirituous and balsamic portions; but the more rapid and agitated is the fermentation, the less is the chance for the alcohol and aroma to be carried off, owing to the vehement disengagement of the carbonic gas which keeps them down. The more quiet and slowly this disengagement operates, the more completely this gas saturates itself with the alcohol and fragrance. It is intended also to keep the scum and film from growing sour, or putrescent, which they never do, when the vintner knows his business and takes proper care. It has, moreover, been proved by public experiments, 1st, that the old method is the only one that preserves the peculiar aroma and inherent qualities of the species; 2nd, that the Gervais Patent does not increase the product by a thousandth part,; 3rd, that the liquor which rises and is condensed in the retort-cover, is three parts water, and the rest a brandy, fetid with the odour of tin; 4th, that there is much to be gained by covering the vat closely, with the precaution, however, of leaving the sufficient openings for the carbonic gas to go off readily; 5thly, that tart, weak wines, treated by the patent, do not become rich or even agreeable; they only gain a higher colour.

As for the *vinification*, the vintage in loosely covered vessels, undergoes a thorough transformation into wine and spirit: both the must and the lees; while in the *close or slow fermentation*, the assimilation is irregularly completed in the racking casks, and the lees, on distillation, afford two or three degrees less of alcohol.

The Gervais-Patent, also, gives to delicate, rosy wines a deeper colour, which, in commerce, may injure their sale, the characters and appearances of such wines being established; but it does not make them purer or more fragrant. Whether the wines prepared by it will keep as well, either, remains to be seen; they are, as yet, too green for an opinion to be given.

We would not have taken such pains to show the errors of this system, save from a rooted antipathy of such attempts to profit by the restrictive conditions of a process, first patented and then falsely cried up. Recommendations given with mercantile complaisance and

* *Dell' arte di fare il vino*, in 8vo. page 169 of the Florence editions of 1785. 89. and 1790. and p. 21. of the French translation of 1801.

facility, or extorted by importunity, have been paraded for the purpose of enriching the inventor, which, in an age when science throws open the gates of benefit to all, is a poor effort at monopoly, and falls with expense and disappointment on the laborious and diligent manipulator of the products of the Vine. Finally it may be said that it is profitable in the South to cover the vats partially, because otherwise the wine would be likely to sour; but in the North the vats must be exposed during the violent fermentation, and closed up as soon as it is over. The wine, it is true, is not as rich, but experience proves that this is the only proper mode to prevent its being soured.

CHAPTER V.

OF THE WINE VESSELS, VATS &c.

The casks, like the vats, should be made ready before the vintage. If they are new, the wood employed in their construction will have an astringency and bitterness that may be imparted to the wine; this serious evil is prevented by soaking them well with cold water, then with hot water in which peach leaves have been infused, and finally with salt and water. Each time the cask must be well rolled and shaken, and the different waters left in it long enough to penetrate the substance of the wood and draw out the hurtful principle. After the salt and water is emptied out, two pints or a gallon of fermenting must, brought to boiling heat, must be thrown in, and the cask bunged and shaken; after which the must is allowed to run out. But some vine-dressers, in place of the above operations, only rinse well with hot wine.

If the casks are old, and have been used, the head is taken out, and the gravel, or coat of tartar that skirts the inner side, is scraped off with a sharp instrument; after which the whole is thoroughly rinsed with warm water, or hot must, or hot wine. If casks have contracted any bad taste; if they have been touched with mould, they must be burnt; nothing can ever be done to conceal or repair these faults, save transiently; they soon re-appear and spoil the wine. To prevent such accidents, the casks, as soon as empty, must be well drained and turned over on the side, and an inch square of brimstone match burned in at the bung-hole; then bunged as tight as possible and stowed away in a dry place. Before using a cask it should be ascertained that it has not soured, which can be found out by introducing a burning match, or a piece of lighted paper; if they go out, it requires purifying. It should be turned down, the bung open, over running water, or the sandy floor of the cellar, for four and twenty hours, then rinsed and sulphured by burning a match in it. The hoops should be examined, to see that none are started or in bad order; water should be poured in to find whether the staves are tight. If they are loose, water must be put in, and the cask allowed to stand awhile on one side, then turned to the other, until there is no leaking; it must then be drained.

Casks are mostly made of oak; some districts prefer them of beech wood, because, say they, the wine ripens better in such, and takes a pleasant taste. They vary greatly in size, but more generally are 4 feet 3 inches long; of cylindrical form, slightly bulging at the middle, like an egg with the two ends squared off. The invention of them is attributed to the people of the Alps,* who varnished them with wax inside, and outside with pitch or rosin. There are inconveniencies annexed to them, such as the qualities of the wood which are soluble in the wine; the shrinking or swelling of the staves according to the state of the weather, and thus giving access to the external air and allowing internal gases to escape from the liquor. They go in different places by the several names of puncheons, casks, pipes, butts, barrels; when larger, they are termed hogsheads, and when of enormous size they are called tuns. The latter are excellent for hastening the ripening of wine; a large quantity of wine together, sooner takes the characters of age than small portions, kept separately.

It has been frequently recommended, in place of casks to use potter's vessels, glazed the like high-glazed pottery of the ancients. Such vessels, have undoubtedly, the advantage of preserving a more equal temperature; but they are all more or less porous, and, in the long run, may change the wine. We might, like the Romans, remedy this porosity by coating them with wax inside and pitch outwards, or else with a cement of lime; &c. but wax will sour the wine, and lime, as I have already elsewhere stated, may add to it disagreeable properties. But worse than this,—these vessels are awkward to be moved, and very brittle, not permitting the multiplied handlings that casks receive without injury.

* Pliny. *Hist. Nat.* lib. XIV. cap. 21.

CHAPTER VI.

OF THE DURATION OF THE FERMENTATIVE PROCESS.

As yet there is no other rule than custom to determine the moment for drawing off from the vat. The rule with some, is when the wine drawn off has no bubbles in it, nor froth upon it; with others, they work a stick around in the liquid and see whether it wheels, as it is called, or makes a circle of foam; others judge by the deep colour: others by the coldness of the vat; others again by the mild and sweet taste.

As a principle, 1st if the vat is very large and warm the must should remain in it but a short time; 2d if the saccharine matter abounds, and the must is thick, and the temperature low, the fermentation will be longer. 3d A defective fermentation in the vat, may, in a manner, be remedied, in the casks, by closing them sooner; 4th, but there are no means of curing a wine that has overpast the due limit and become tart, or musty, or spoiled with carbonic acid, so as to restore it to its proper qualities.

The wines of St. Basle, Verzy, Versenay, and Mailly (de la Marne) known for their fine colour, great delicacy, high raciness and fragrance, remain only 6 hours in the vat. The most superior wines of the departments of Saone and Loire, Cote-d'or and l'Yonne, and especially those from the Vine-grounds of Pouilly, Meursault, Tonnerre, and Chablis, cannot stand the vat longer than from 6 to 10 hours. The wine from Volney, which is the lightest, most delicate and agreeable of all the wines of the hills of Beaune, or even of all France, is left in the vat no more than 6 hours. But there are some wines not yet perfect after nine days of fermentation.

The length of time required for the vat is sometimes only important on account of the colour; as in the case of Pomard wine for instance. But if the pressing crushed the whole of the grapes sufficiently, so

that the colouring matter would mingle with the must without our having to depend on the brisk or violent fermentation to extract it, it might, I think, be found, that the stem and the stone are both better cleared away than left in the vat, notwithstanding their apparent advantage in some cases. This idea is merely hazarded to elicit experiments by well-informed vine-dressers. Meanwhile let us look to the matter in hand.

The proper time for drawing off is when the transformation to wine is complete; but, the sinking back of the chaplet, or sheet of scum, though it shows that the strongest fermentation is over, yet, as there are several degrees of change to be undergone by the liquid beneath, before it falls as low as it should go, it remains to be seen how low it must have sunk to afford a sure indication to judge of the completion of the wine. The motion of the wine, or its limpidity and calmness when a glass is drawn off, are by no means signs worth resting on.

Colour and taste would be preferable indications, but taste and smell are senses so differently enjoyed by different individuals, and of the infinite shades of colour it is so difficult to render a just idea, that neither can be looked to. As the heat developed by fermentation depends on the sugar and spirit in combination, it is idle to refer to what is so perpetually variable. Indeed, vats will often have reached their maximum of heat at the end of 21 or sometimes 10 hours, and the wine not be complete till 20 or 26 hours after. The thermometer alone is therefore no infallible guide of vinification.

The essential point is, then, to find a fixed, invariable method, independent of circumstances, and at the same time capable of application by intellects of the meanest grades, so that not the dullest workman need fail to comprehend it. My late friend *Belfroy de Beauvoir* had turned his attention to this subject, and from him I have received the following account of his observations.

"I have long busied myself about the regulation of the drawing off. I have thought, that if it could be rated by some simple, economical, mechanical process, the art of making wine would be quite a household affair, no matter what the climate, soil, or quality of the grape, or all the other accessaries which often make the usual indications swerve from their exactness.

"My idea was to find a measurement of the degrees of fermentation from the first sensible movement until the complete vinification, that is to say, a scale affected by the first sensible repulsion of solids from the fluid, which shows that the ferment is begun, until the equally sensible retrogression or reaction, showing its decrease has taken place; for it seemed to me that there must be a fixed relative propor-

tion between the expansion of the fermenting must, and its subsidence; and I thought I could deduce from what I saw, that the drawing off should be practised as soon as the film or scum had settled downwards. I therefore marked degrees on a yard-stick, placed upright in the middle of the vat, and I watched the ascension and fall; the wine was perfect at the time proposed. But in dry and hot years, when the grape is very ripe and contains more fire than sugar, if the wine is left until the scum has sunk, it is hard, heady, rough and fiery. In rainy years, when the grape is full of water, the wine, at that degree, is not perfect; in seasons that are dry without being too hot, seasons generally remarkable for the abundance of sugar in the fruit, the moment the retrogression of the head is accomplished, is the exact time for drawing off the wine.

"With the help of these facts, and knowing that the same principles, mere chemical combinations, were at work to effect the sinking, that accomplished the expulsion and ascent of the chaplet or head, I deemed that *the time*, be it greater or less, required in the ascent and in the fall were proportioned to each other, and by that, some lights might be given. I therefore tried it, whether, allowing as long an interval from the stagnation of the head, to the drawing off, as had occurred between the crushing of the fruit and the first degree of sensible ascension, would allow time for the wine to be completed, in cases where it was not finished at the settling of the head. The first year I was completely successful. The next the season had been very different; and I was somewhat behind-hand in the wine; the next season, the wine was a little overdone. As my regulator was not more than an inch thick, and simply thrust into the vat without being firmly fixed, I attributed these different results to some displacing, or my own careless inaccuracy. The next season, I took a piece of poplar plank, 5 inches broad, two thirds of an inch thick, and nearly as long as would reach across the vat. Through the middle of it I passed the yard-stick, fastened down; and the plank, being perfectly flat and extremely light, would work up and down with perfect facility following the swell or decline of the scum. This method was more exact, and I have found it of use for three years past. I intend to perfect it much more; by combining the strength of the fluid and the heat of the vat with my other calculations, and making the matter so clear, that the most unlettered farmer, may seize with half an eye, the proper minute for drawing off, no matter what the previous or attendant circumstances"—Such was his statement; but exile and death have prevented him from keeping his word.

To draw off, the tap of the vat is turned and the liquor removed to

the cask in measures made for the purpose. But the first thing to be done is to remove the scum which has soured by exposure to the air, with the utmost precaution, by means of a wooden spaddle. For should this film turn under, the whole vat of wine will be good for nothing. Wines of peculiar excellence are drawn off by funnels and syphons that prevent the open air from striking the wine, as it does in the common method, both when it falls into the measure, and again when it is emptied into the cask.

CHAPTER VII.

OF THE WINE PRESS.

As soon as the wine is drawn off, the murk, or pumice, is to be lifted out and subjected to the press; it affords a wine nearly equal to that which has flowed freely from the vat. It is distinguished into first, second, and third qualities, according to the first, second, and third cutting of the murk. The wine produced by the first cut is the most lively, that from the third, the tartest, hardest, coarsest, and deepest in colour. The residue is kept near Montpellier for the fabrication of verdegris; in other places it is packed down, well sprinkled with bran, and dealt out as fodder for cattle; or is used as a manure for vineyards, or food for pigeons, who eat it with a sort of gluttony; others apply water to it, and draw from it beverages slightly vinous and tart, that go by the name of pricked wines.

Some make a practice of mingling the vat and press-wines together as soon as made, which is wrong; it is better to keep them apart until it is seen whether it be necessary to add the press-wine to the other to heighten its strength or colour. Otherwise there is a risk of entirely depriving the wine from the vat of all its perfume and delicacy; and also to render it hard, dull, thick, and indigestible; press-wines alway being tart, harsh, and dark coloured.

When the murk is to be used for vinegar, only one turn is given to the press.

There are many sorts of presses; of the two most in use, one requires from ten to twelve men, breaks often and is slow; the other, every way less costly, requires but four men and has a greater effect than the former. But both of them cut the murk at each turn, which gives the harsh taste of the stem to the wine. A third press, called the single or double box-press (*le pressoir a coffre simple ou double;*) is the best yet invented; the wine that proceeds from the highest pressure is separated from that which flows first, because of inferior quality; but there is no cutting of the murk. The press is filled seven feet thick with the pumice, which it reduces to 18 inches, yielding one fifteenth more wine than is obtained by any other sort of press.

CHAPTER VIII.

OF THE WINE-CELLAR.

The cellar is all-important for the preservation of the wine. The best cellars are such as are dug out under uninhabited dwellings, as is seen in the districts most famous for wines; exposed to the North, and 50 or 60 French feet deep, according to the dryness or dampness of the soil. A certain constant, but not excessive humidity is necessary; if too moist, the casks rot and are apt to make the wine musty; if too dry, the staves shrink and the wine leaks out. The light should enter moderately, by openings at suitable distances; these windows should be protected by narrow pent-houses and closed when it is too hot or too cold. The ceiling of the cellar should be solidly vaulted and very thick, to prevent the shocks and pressures which it receives from being communicated to the casks below. In summer, as in winter, it is well to cover the floor above with dry rushes, straw, or any such material to prevent either violent heat or cold from extending to the cellar. The floor of the cellar should be very smooth and beaten hard; that part of it intended for the bottled wine should be sanded. The cellar should be kept clean; if too damp it should have more and larger windows; if too dry, fewer windows and those made smaller. When badly situated it is easy to shelter it from the rays of the sun by building small buttresses in front of the windows, or by stopping them with a board covered with earth, or sods, which is better.

The casks should be set perfectly horizontal on a stilling 6 or seven inches high, made of squared joists; and be supported with wedge-shaped pieces 4 inches long and 3 inches thick, which must be driven between the staving and joists quietly and with great care. Neither stilling nor casks should touch the wall in any place; thus fixed they are firm, and safe from rotting. If the casks lean forward, the lees are carried to the front and stop up the tap; if they incline backwards the evil is worse; when the cask must be lifted up to let the liquor run off, the whole becomes troubled. If perfectly horizontal the lees settle in the lowermost part of the side and every drop of the limpid wine runs off clear.

Garden stuff, green wood, flowers, fruit, &c. must never enter a wine-cellar. Sooner or later they are sure to sour the wine, by the exhalations that arise from them.

CHAPTER IX.

OF THE MANAGEMENT OF THE WINE IN CASKS.

The wine works in the casks from the first day that it is transferred to them. If the ferment in the vat was regular and continued, the new commotion will be almost insensible, and vice versa. It is the carbonic acid gas which excites this agitation; it tends incessantly to escape, it swells the size of the liquid and makes it froth out at the bung. The casks, therefore, should not be entirely filled; a space of two inches should be left and the bung be driven in close enough to prevent the air from penetrating; the spigot-hole beside the bung should now and then be opened to allow the gas to escape; but this must not be done too often nor too freely, as it risks souring the wine. Instead of bunging tight, and opening the spigot-hole some vine-dressers cover the bung-hole with folds of cloth covered with a coat of sand; others with Vine leaves held down by a piece of tile. When this ferment is over, and the liquid sinks back, the casks should be filled up and bunged tight; the bung wrapped with hemp or tow, or old linen, which must be fresh and clean, as a film gathers on the bung that may be hurtful to the wine.

In some districts they fill up every day during the first month, every four days the second month, and after that every eight days until the racking off. This is the method used with the Hermitage wines, around Bordeaux; they fill up after the first week; a month after they bung the casks lightly, and fill up every week, gradually tightening the bung. In other places they fill up regularly every ten days during the first months, then once a month until the racking off. And in some they do it every two months, if the cellars are passably dry, and every three months if they are damp. The filling-up should be done in cool dry weather, and the wine employed never be of a quality inferior to that in the cask. The cellar should be visited at least once a day, so as to remedy on the spot any accident that may have taken place, through wormeaten spots in the staves, by the shaking of the casks in

rolling them into the cellar; by mould on the hoops or heading from the damp; or from the shrinking of the staves. The wine also should be tasted from time to time, to observe what alterations have occurred, that they may be remedied promptly.

When the filling-up is neglected, a white mould collects on the surface of the wine. This must be attended to immediately, as the acid fermentation commences by this symptom. The air in the space must be first forced out; to this effect the nozle of a bellows is introduced at the bung and the air drawn in from every side. A lighted match is then put in, the bung closed, and the match allowed to burn; after this the cask must be entirely filled up, and then, several smart raps on it expel the bubbles of air that are lodged in crevices and drive the mould towards the bung-hole; in a few minutes a slight jolt must be given to the cask with the knees, which will make the wine at the bung run over a little, when, by blowing upon it, the film is carried down; the filling-up must be repeated, and this process tried again, until not a vestige of the mould is perceived.

The wine also works in a singular manner when the Vine begins to shoot, at the time of flowering, and when the grape turns. *Buffon* attributes all this working and all the changes of the juice of the grape from the state of must to that of vinegar, to the action of organic molecules. According to *Fabbroni* and the remarks in confirmation of his by *Astier* of Toulouse, these phenomena of vegeto-animal matter are only remarked when the organic molecules have not been separated from the wine by a sufficient quantity of alcohol. "Then," says Astier, "as these elements of organization cannot remain idle while the Vine is busy with growth, and as, in the vat or cask they cannot produce leaves, flowers, and fruit, they will produce something animated, vintage gnats, wine-mould, or the microscopic eels of vinegar. These phenomena" he adds, "prove that life, though unapparent in the whole, subists in the parts, though detached and separated, and preserves in spite of death, a certain relation with the general life of the species to which the individual belongs."

These phenomena may be prevented by the use of anti-fermentative substances, such as sulphuric acid, sulphate of lime, mercurial oxyds, alcohol, garlic, camphor, the cold of ice, boiling heat. The manner of using all these various means shall be spoken of hereafter.

When the fluid seems at rest, though turbid, it is complete. The turbidness is caused by the foreign substances in suspension, which, with time and quiet, sink to the bottom; when the pulp and murk, colouring matter and tartar, form the lees. The tartar separates partially and crystallizes on the sides of the casks.

CHAPTER X.

OF RACKING.

But the lees, once precipitated, may mingle anew, and muddy the clarified wine; or even produce a new fermentation and injure the quality. For this reason the wine must be removed from the lees. Some rack the wine in December, if it is well cleared, and they wish to transport it; others do it only once a year in February or March. In some places the wine requires to be racked twice during the first year, once at the beginning of spring and a second time at the end of September, or towards the end of December during sharp, clear frost, and about the middle of May. Wines that are mild should be racked soonest, with harsh, hard wines it should be delayed longer. Rich high-flavoured wines may lie on the lees three and four years, and only be shifted every two years, without injury. Such are the red wines of the Marne river, and especially from the St. Thierry enclosure near Rheims. But in general, wines should be removed from the coarse lees before the spring equinox. There are, however, cases, in which the lees and wine are better left together than separated, for the sake of prolonging the fermentation and ripening the wine; but it must be done with great watchfulness; the moment the wine shows a tendency to pass to the acid degree of fermentation, it must be racked without delay and transported into a colder place; if it is turbid, it should be fined before racking. The most suitable time for the operation is fine, clear weather, especially as regards the first racking. It should never be attempted while the Vine is in blossom; at that time the wine undergoes an accelerated internal ferment, and should be kept as quiet as possible.

For racking, the head of the cask must be pierced about three finger's breadths from the chine; this is done with a tap-augur large enough to make the opening at once; as soon as a drop of the liquor shows, it has pierced enough; the gimblet is withdrawn and the cock put in its place; the faucet must be turned just so far that the wine will flow through the channel without the air disturbing the surface of the liquid as it passes. As soon as the cock is fixed, the bung must be gradually lifted as gently as possible, to give entrance to the exter-

nal air. When it has done running, the cask is raised by levers, and care must be taken to be sure that the raising has not made the wine turbid; if it is troubled it must not be mixed with the clear wine. This is the most general way of racking, and the most expeditious. But it is not a good method for wines that have a delicate bouquet, because they are so much exposed to the air when running from the tap, and when pouring into the funnel.

At Beaune (Cote-d'Or) the wines of which have the reputation of being the most relishing of all the wines of old Burgundy, they rack with copper taps, to which a leathern pipe is attached terminated by a wooden tube, that is slightly conical. The cask to be filled is laid on the side, and pierced on the topmost part with some small gimblet-holes; when it is filled, the holes are stopped and it is rolled over on the bung.

At Condrieu (Rhone) they rack the wine the week after it is made, and before the end of the month, they fine it, to divest it of clamminess; every fortnight or twenty days they rack it over for the space of a month or two; by this means they give it that perfectly limpid clearness for which it is so remarkable. Each time it is thus racked, the cask is sulphured strongly, even more than for red wines; this increases the body of the wine. This white wine lasts from fifteen to twenty years; as it grows old it acquires the colour and taste of Malaga; its repute has been at its present height for several centuries. It is thought that the species of the grape was brought from Dalmatia; it is known by the name of *vionnier*. The Hermitage wine owes its origin to the vineyards of Condrieu. *

If the casks have to be moved three or four months after racking, it is advisable to rack them anew first, lest the deposit they have made should rise and cloud the wine, and change the taste.

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* It is related that an inhabitant of Condrieu having turned hermit, he built himself a cell on an uncultivated sterile mountain, in the neighbourhood of *Tain*, and employed his leisure hours in breaking to pieces the rocks around his dwelling. Having planted slips from Condrieu they succeeded perfectly. His example excited emulation, and valuable vineyards soon covered the stony sides of the mountain, from which the Hermitage wines are still raised.

CHAPTER XI.

OF FINING.

Wines, which are not clear after racking, contain a sediment of such divisibility, that it can only be removed by fining, and a secondracking.

The most usual substances employed for this purpose, are isinglass and whites of eggs.

Isinglass must be unrolled, shred thin, and soaked in wine. It swells, softens, and then becomes a viscous jelly, which must be poured into the cask. The wine should be well beaten with a whisk, and allowed to rest. The quantity of isinglass used, is about a half ounce to every 250 or 300 gallons of wine.

Whites of eggs are preferred in the South to fish-glue; they are well beaten with wine, and poured into the cask, which is then stirred either with a whisk, made of split wood, or made of tufts of horse hair fixed to an iron handle. The wine is left to rest for ten days or a fortnight, and then racked in a North wind. From six to ten eggs are required for every 25 gallons of wine, according to the paleness or depth of the colour. Some farmers make use of gum arabic in powder; others of hartshorn shavings, calcined ground flints, starch, rice, milk, beech-wood chips boiled in water, and sun or oven-dried. But, none of these substances produce as well or as quickly the results obtained by fish-glue or whites of eggs.

There is a reddish-brown powder which is sold at a very high price, for the clarifying of wines; but it is nothing more than dried blood. It only acts through the albumen contained in blood; and a couple of eggs would have the same efficacy, without altering the bouquet of the fine wines, by the fetid, glue-like odour of the dissolved dried blood. The gelatine of bones is still worse than blood. Common and new wines lose a portion of their rawness by fining; good wines require more subtilty of relish and appearance.

CHAPTER XII.

OF THE SULPHURING OR STUMMING OF WINES.

This process is the impregnation of the wine with sulphureous vapours,by burning over it sulphur matches. The matches are simple or compound. The simple are made of a slip of cloth or muslin, 6 or 7 inches long, and 1½ inches in breadth, that is soaked in melted sulphur. Compound matches are prepared by adding aromatics to the sulphur, such as pounded cloves, cinnamon, ginger, coriander, or Florentine orris root; or nips of thyme, lavender, or marjoram; or orange-flowers, &c. Those fabricated at Strasburg and which are rolled in violet-leaves, are esteemed the most.

The match is lighted, and suspended by an iron wire in at the bung-hole, which is then closed tight, and the match allowed to burn. While it is burning, the internal air escapes with a hissing sound from every fissure; these should be instantly stopped with any coarse luting at hand. Stumming discolours the wine and renders it turbid, but it soon recovers. Wines that have been sulphured keep longer, but red wines are faded by it, consequently, sometimes diminished in value. Owing to this, of late years, the following plan has been adopted. A small quantity of brandy is poured into the cask, and set on fire by a burning string, and while it is burning, the hand is held over the bunghole without closing it entirely. This is now the prevailing custom in all the department of Herault.

In Marseillan, and wherever the Picardan wines are made, a sort of syrup is prepared from white grapes and called stum, which is used in preference to sulphuring. It is prepared in the following manner: as soon as the juice of the grapes flows from the press, it is stoutly stummed, to prevent its fermenting, and is poured into casks one fourth filled. Several matches are burned over the liquor, and the cask bunged and repeatedly shaken, until, when the bung is opened, no gas escapes by the opening. More must is then poured in and matches burned again, and the process of shaking repeated; this is continued, until at last the cask is filled. Must prepared in this manner, never ferments; it has a sweetish taste, a strong smell of sulphur, and if a proportionate quantity of high proof alcohol is added to it, it makes a very hot cordial wine, called Calabrian wine; and is employed to give strength or sweetness to wines that are tart or poor.

CHAPTER XIII.

OF BOTTLING.

So long as the wine remains in the cask, it is slowly making alterations for the better. There are some very superior, generous wines that will stand the cask for three or four years, such as those of the *Clos Saint-Thierry*, which unite the hue and the bouquet of Burgundy, to the lightness and liveliness of Champagne; such also are those of the *Clos-Vougeot;* but it is only in well corked bottles that wine acquires all the finish of its properties. The more spirit, nerve or raciness, and body that a wine has, the better it is for it to be bottled; but light, delicate, tender wines do not bear it so well. Bottling will not bear negligence; very good crops now and then are so injured by bad bottling as not to be recognizable. It should be done 13 months after the vintage; the selection of bottles and corks, and the preparation of the pitch or wax to cover the cork should not be entrusted out of the hands of the master.

Bottles carelessly tempered, or of poor glass, change the wine; those that have been used are apt to take a bad taste from the cellar: especially if they have been stowed away standing, and it is very hard to clean them; if not thoroughly cleansed they are sure to spoil the wine. If not of regular sizes and dimensions, it is hard to arrange them smoothly, and they are very subject to break in the pile. That the bottles be of equal sizes, and from some manufactory of reputation, is the first requisite. The second is to rinse them twenty-four hours before they are used, not with duck shot as some recommend, which is a dangerous practice, but with gravel-stones, or a piece of steel chain. They must be stood to drain on drilled boards; and if they are to be used for any weak wines, a little brandy should be poured in them first; this rinsing with brandy is not to be practised if they are to hold fine wines, the bouquet of which would be destroyed by the brandy.

Every bottle with a flaw, or coat of tartar, or the slightest musty smell, should be rejected without fail. Bottles for Champagne should be of very thick glass, well annealed, and from some known glass-works, or the wine is risked with a dead certainty of loss.

Quality of the Corks.

They should be round, new, and very sound; round, that they may fill up the neck compactly; new, to give no ill taste to the wine; and very sound to prevent breaking as much as possible. They should be elastic; a stiff cork will break the neck of the bottle, or else does not fit well. In France there is a trade carried on in old corks by houses that consume a great number; they are re-peeled and offered for sale, but may be known by the dirty brown colour of the pores; the new cork is always of a reddish brown in the streaks. These furbished corks are only fit for bottles that are to be used immediately The corks are driven in with a wooden mallet.

Of Securing the Corks.

Unless the corks are waxed, if kept any time, the wood-lice gnaw them, or they rot from the damp, and the liquor leaks out. The best wax is made of the following articles and in the following proportions for 300 bottles:—2lbs. rosin and ½lb. of Burgundy pitch, ½lb. of yellow bees wax, and a small sprinkling of red mastic, melted together over the fire, and taken off as soon as the scum rises, properly stirred and incorporated, and put back on the fire to melt for use. Tallow may be substituted for bees wax, but in smaller quantity; too much tallow and the wax will not harden; too little wax or tallow, or none, and it will not cleave. The neck of the corked bottle is plunged into this liquid for about two thirds of an inch, and then turned up to harden.

Of Piling the Bottles.

The bottles must be laid, so that the deposit may fall on one side of the bottle: and the cork be kept constantly moist. The ground should be perfectly level and well sanded. The bottles are ranged side by side, with some scantling under the necks to support them; a layer of sand an inch or an inch and a quarter deep must be strewn over the first range of bottles before a second can be piled upon them; and so on with every range. The piles are made a yard high; they may be laid in the middle of the cellar if with the precaution adopted in the department of Marne, of interposing a thin scantling or frame work of lathes, supported at the ends. The upright bits to which the horizontal pieces are fastened, sustain the mass and give strength to the pile.

CHAPTER XIV.

OF THE MIXTURE OF WINES.

Do not seek to make artificial wines; it is a loss of time and money: you cannot imitate nature, or deceive any connoisseur, and most often you will have to reproach yourself with having been the origin of many a dyspepsia, and poisoned old men and invalids. Throw away your recipes for Spanish and Rhenish wines, artificial wines are a deception that may induce immedicable injuries in the systems of their drinkers.

All wines that depend for their credit on their bouquet, should be preserved pure. But it is the vinedresser's interest to mingle the slightly altered or middling wines with those that are more generous; it should be a point of honor, however, to acknowledge mixed wines, and not pass them off for those of a known growth or season.

Sometimes a pure wine has an earthy taste, or a tartness that strikes the palate; or its colour is so deep as to be disagreeable; the addition of an inferior white wine, well fermented, and rich of the taste of the fruit, will convert it into an excellent liquor.

Wines of a bad season may be mixed with those of a good year. If you have white wines disposed to mottle and turn yellow, they may be mixed with very high-colored red wines; making them more pleasant to the taste, and apparently older.

In the neighbourhood of Bourdeaux they correct the slight roughness of their wines by mixing them before they are racked, with Hermitage wines from the department de la Drome, with those of Cahors, (Lot,) and those of the best vine-grounds of Gard, Herault &c. A very lively fermentation begins between them, and terminates in the complete fusion of both into one, under the name of Medoc.

I should by the way observe, that all Hermitage wines that have a decided flavour of raspberry are fraudulent wines; some indeed have said that the red Hermitage has the bouquet of the raspberry; but this is erroneous, and has given rise to a thousand devices and impositions.

In general, all the wines of Roquemaure; of Saint-Giles-les-Boucheries; of Bagnols, (Gard,) of Saint-Georges; of Orques; of Verargues; of Saint-Christol; of Saint-Drezery; of Saint-Genies; of Castries; (Herault,) of Cunac; of Casaignet; of Saint-Juery; of Saint-Amarans; of Gaillac, (Tarn) of Narbonne; (l'Aube); those of Rivesaltes, Baixas, Corneilla de la Ribera, of Saint-Jean Lasseille; of Banyuls-des-Aspres; of Argeles and of Sorrede (Eastern Pyrennees,) are all employed, most usually, to add body, colour, or taste to the wines of other departments.

CHAPTER XV.

OF THE DEGENERATIONS AND ALTERATIONS OF WINE.

Though prepared with many cares, the best wines are subject to alterations and changes. The duration of wines depends on the temperature of the season, the stock, the grape, the mode of cultivation, the wine-making and the cellar. The Marne-river wines last at most from 6 to 12 years; the Rhenish wines outlive a century; the wines of the South will count as many as 20 or 30 years. White wines seldom can bear the cask more than two years, and the bottle four or five; the red are more lasting.

The most frequent changes of the wine are from Roping, Acidity, Bitterness, Turbidness, Pricking, Mustiness, Freezing, and Sediment.

1. *Of Roping.*

Roping is a milky alteration undergone by wines produced from crops in a rainy season; when the fermentation has been weak; they lose their natural fluidity and become as viscid as oil. White wines are but slightly subject to this, unless very weak and meagre; those that have scarcely any spirit will rope even when well corked, but recover and become limpid of themselves. This recovery generally takes place about the first or second succeeding season. The whitish sediment that was the first characteristic, becomes brown, dry and deposited in scales, restoring its former transparence to the wine. It is not, however, prudent, always to wait for this moment; *cream of tartar* should be resorted to, or, as the chymists term it, in wordy style, *sur-deuto-tartrate of potass* is necessary to cure the roping. For a barrel containing 75 gallons take two gallons of wine, whether ropy or good wine the effect is the same, and heat this quantity to boiling heat; then throw into it from 6 to 12 ounces of very pure cream of tartar, dissolved with its weight of sugar; pour the whole boiling hot into the cask, which must be bunged and luted air-tight, then shaken and

rolled for five or six minutes. If the heads of the casks appear strained during this operation, a spigot hole must be instantly made near the bung, but only a very slight portion of the gas must be permitted to escape ; it is the carbonic acid gas which destroys the vegeto-animal principle which is the cause of ropiness. Two days after, the wine must be fined ; but instead of whisking with the bung open, the cask must be only rolled and then left to rest. Five days after, the wine will be found limpid, clear, clean, free from roping ; it must then be racked off. *Bottled* wine that needs clearing, must be poured into a cask and proceeded with in the same manner.

There are other remedies pursued, such as drawing the wine over fresh lees ; fining and stumming with care ; raising the temperature of the air ; bringing the bottles into the open air ; fining with isinglass and whites of eggs together ; all these things may be repeated over several times, if need be, taking care to pour the wine from a considerable height, that by its agitation it may become imbued with atmospheric air. But to tell the truth, the wine is never as good, cured by these prompt measures, as when it slowly re-establishes itself.

2. *Acidity.*

All wines may sour, but weak ones are most liable to turn acid. This change is very common at the rise of the sap, or during the flowering ; it must be remedied in the very onset, as it is a constantly increasing fault. The wine must be drawn off into a cask that has been highly impregnated with sulphur from burning matches ; this cask must be placed in a colder spot than that where the wine was stored previously, and must be *filled-up* faithfully, as is done with the new wine. Every vintner has his own recipes. One boasts that one fifth of skimmed milk added to the cask will cure it ; another that honey or barley-sugar melted in the wine is the thing ; another commands the wine to be saturated with acetate of magnesia ; another that it be fined with bone-glue. But the best means is to pass the wine, during the vintage, through the vat, after having drawn off the new wine. This will restore it to its taste, but it must be consumed as fast as possible ; because it is very sure to return to its previous state during the next shooting of the Vines.

If the acidity has arrived at the second degree of fermentation, nothing can be done ; and it must be converted into vinegar. If the acidity is only on the surface there is a way of remedying, which is

this; the cask must be quietly unbunged, and the canula or funnel invented by M. Horpin plunged pretty deep into the cask; good wine being poured through this instrument, the spoiled wine on the top runs over at the bung, without mingling with the wine of the cask, or that used in filling up.

3. *Of Bitterness.*

This complaint generally befals only the best wines, and is one of the results of age. The wines of L'Yonne, a part of Cote'd'Or, and of Saone and Loire, which are very subject to it, have, when mature, a slight undertaste of acerbity; they are often limpid while labouring under this alteration. If they are in casks they may be restored by passing them over new lees, or renewing them with fresh wine of the same vineyard; but they have lost their bouquet, and are perpetually on the brink of relapsing. They must be drawn off and employed immediately, or else made into brandy. A cask may be fined with the whites of four fresh eggs, and left to settle a month or two; and then, if perfectly clear, be racked off into a fresh well-sulphured vessel.

If the wine is bottled, it may be hoped that it will re-establish itself at the end of two or three years, if not touched or disturbed. The wine has then lost in its bouquet, and colour, but gained in finish and delicacy; is very agreeable to drink and cordial to the stomach. It must be drawn off before it is moved abroad; some Vine-growers accelerate the recovery of the bottled wine by carefully drawing it off whenever they perceive that it has deposited a sediment

4. *Loss of Colour, or Turbidness.*

All wines as they grow old become paler and are the better for it; but the loss of colour which is an injury, renders the wine opake; red wines become black, and white wines take a livid yellow hue, and the taste becomes very disagreeable; they are then called *scorched.*

The first thing to be done is to remove the bung and air the wine; then rack it off into a well-sulphured cask, place it in a very cool cellar, there rack it anew and fine it. If these means do not suffice, there must be a mixture tried of stout and bland wines, old and new wines; but only those must be used that are of the same vineyard. If none such are on hand, recourse may be had to those already

mentioned as used for mixing; but the new should not be under ten months, and if possible should be a year old. If wines of four or five months old are added to those of three or four years, not to say older, their principles are not in harmony, and the evil ferment will redouble instead of being allayed.

Though some bottled wine, attacked by this change, has been known to recover by itself, it would be very unsafe to risk the loss of all the wine in expectation of such a fortunate circumstance. It is best to stum, fine, and rack.

5. *Of Pricking.*

This seems to be occasioned by the contact of the external air; and seldom comes from any other cause than negligent bunging up. The wine is impoverished, grows pricked, and loses its bouquet; white filaments are seen in it, a proof of the alteration of the vegeto-animal principle. At first it may be easily relieved, especially if the wine has body and strength: it must be racked off into an empty cask which has lately held good wine, and which has been thoroughly sulphured; the cask must be filled up and luted; a fortnight after, the wine must be fined, racked, and bottled.

But if the taste is very sharp, one third or more of newer, strong, and more alcoholic wine must be added; or what is preferable, 15 or 20 gallons of fresh lees to a cask containing 240 bottles; mix it up well with the altered wine once a day at noon for three or four days; then let it rest a month, rack it off and bottle it. If the accident happens during the vintage it would be well to pass the altered wine over the murk.

It is almost needless to add that by fresh lees is meant the lees from which new wine is racked, and that there may be substituted for it, for some wines, either brandy or alcohol in certain proportions. But the drugs in recipes for this purpose, such as salts of saturn, ceruse, litharge—are to be avoided; they are preparations of lead and all poisonous.

One vine-grower has saved his wines from pricking by watering the outsides of the casks, during the season that the products of the Vine are disquieted by an internal ferment, with cold well-water or even applying ice. The cold promptly arrested the elementary fermentation, and prevented its developement.

6. *Of Mustiness.*

Many causes may give rise to this serious accident. An ill-conditioned cask, a rotten egg used in the fining, an immense quantity of insects crushed with the fruit, or spoiled grapes that have got into the vat, will give the best wine a musty taste, and take away its bouquet.

Racking off into a well-conditioned, sulphured cask, and throwing in a handful of cracked peach-pits, shells and kernels both, sometimes remedies the evil when taken at the commencement. Some advise that beech-wood charcoal should be put into the cask; others to cut dead ripe medlars into quarters, string them and let them macerate in the wine for a month; or to take a slice of toasted bread or a handful of toasted wheat, put it in a bag and hang it in at the bung, for three or four days. But if the alteration is decisive, it is useless to deceive yourself; for it will be next to impossible to re-establish the wine, even by a mixture with other wines. It even makes a bad brandy, and the vinegar from it is hardly passable.

7. *Of Freezing.*

When the wine, as will sometimes happen in a cellar not sufficiently tight, or during transportation in winter, is caught by the frost, it must be immediately racked off, carefully avoiding to break or disturb the ice, and so bring it away with the liquor. This ice will make the wine weak and flat; though the water of which it is composed was one of the constituent parts of the wine, yet, by freezing it has been rendered insipid and raw. But with due precaution, though there will be a loss in quantity, the wine will be sensibly bettered, when separated from the aqueous part which disposes light wines to sour; the liquor is more alcoholic, and if new, loses much of its harshness. For this reason many vine-growers expsose their casks to hard frost.

But if the vessels are overlooked and a thaw should strike them, the consequence is that the liquor is turbid, pale, and sometimes of a livid colour. This is remedied in part by racking into sulphured barrels, and adding a little more than a gill of alcohol to every cask containing 500 bottles, then bunging air-tight; and if the wine is settled in a few

days, fining and bottling it. If it is still too weak, it must be heightened by mingling with it a stronger wine.

8. *Of Sediment.*

As they acquire age, and according to the crops and seasons which have produced them, some wines are subject to form settlings, of a nature different from the lees. These are of two kinds; the one becomes a mass at the bottom of the vessel, or coats the sides; the other, specifically lighter, keeps suspended in the liquor.

This sediment has the appearance of litharge, and to discover its nature the following test is used. Dry it and throw it on live coals, if it burns with a thick smoke and the smell of burning tartar, keep up the heat and it will leave a small white residuum, which is simply potass; if the presence of litharge is suspected, a few grains of flower of sulphur thrown into a tumbler of the wine will immediately make it known by a heavy black precipitate.

Tartar precipitates in the form of scaly crystals in almost all wines, even the best; in fat oily wines it looks like a muddy sand, so also in mixed wines that have not equally fermented. Tartar gives no ill taste and but slightly affects the limpidity of the liquor; it is even thought that it makes it neater, less subject to alterations, and more fit for keeping. Bottled wine should never be changed unless for immediate drinking; except where the wine is to undergo transportation; in that case it must be put into new bottles, because the moving would shake up the old sediment and injure the taste and transparency perhaps without remedy.

This pouring off from one bottle to another requires patience and address; care must be taken to keep that side of the bottle downwarks which has always been the lowermost, and the pouring must be done slowly, and with a firm hand, to the last spoonful, which must not be allowed to enter the new bottle.

A funnel to facilitate this operation and to prevent waste, has been invented by M. A. Jullien, author of several works on rural economy. He names it *Cannelle aerifere*; and its construction leaves nothing to be desired.

Red wines cast a heavier sediment than white wines. Those, the sediment of which is so light that it mixes with the liquor the moment the bottle is moved, cannot be poured off clear; Such for instance are the sparkling wines.

BOOK FOURTH.

OF BRANDIES.

Wine as soon as well-fermented, with the whole saccharine mucilage transformed into spirit, is convertible by distillation into what is termed brandy. I shall touch upon the process merely to lay before the farmer and vine-grower, the most simple, easy and expeditious means of distilling in the small way, which is often a highly advantageous family resource to those who cultivate vineyards. I shall confine myself to the strictly necessary directions, leaving the distiller on a large scale to recur to the professional works on that subject.

The process is so entirely of modern date, that there is not on record a single fact of its being known or practised before the thirteenth century, even by the Arabians so well acquainted with the distillation of perfumes and essences. It is generally conceded that the invention is due to *Arnaud de Villeneuve* of Lyons. It was not brought to perfection till so late as 1801, when, for the first, an economical and complete method was introduced by *Edouard Adams* of Nismes. Happening to be present at a chymical lecture where Woulf's apparatus was exhibited and discussed, he, though a mere manipulator, was struck with the idea of a new still for wines, and succeeded to arrange one; by which, with one heating, the whole spirit of the wine might be drawn over, and the brandy be not only equal to Dutch proof, but to 35, 36, and 37 degrees, proof.* The only improvement of which Adams' method was susceptible has been made by *Isaac Berard*, and the art of distilling owes to them both the highest gratitude.

* These are distiller's terms for such spirit as stands at 29o. in the areometer of *Cartier;* 2nd. such as stands at 34o. of the areometer, and was drawn over by the 12th rectification in the old method, 3rd. such as was produced by the 13th rectification, and stood at 33o of the areometer.

CHAPTER I.

SELECTION OF WINES.

Brandy can be obtained from all wines, but in very different proportions and qualities; the heaviest wine gives the most and the richest. The wines of the South yield the best brandy; one very rich wine of the department of Drome gives one third of its bulk in brandy; wines of Herault yield one fourth; of la Gironde, one fifth; and of la Cote-d'Or, only one eighth. Further north the product is still less.

The sweeter the wine the more excellent the brandy; and from old wines it is better than from new. Common coarse wines furnish it plentifully, but rather weak, and very subject to have an empyreumatic flavour. Wine on the turn will yield a large quantity, but of inferior quality, and containing much malic acid. From wine high-charged with tartar the brandy is still poorer. Brandy from wines made of green grapes, or grapes gathered in cold and rainy weather, is inferior and scanty. Austere wines yield an abundance before the souring is complete, but after that, it is of a very poor quality.

White wines are generally preferred to red for distilling, not because they produce more brandy, but because they are cheaper, and the liquor of a milder and pleasanter taste. The white grapes of the left bank of the Charente, of the environs of Rochelle, of Saint Jean d'Angely, of Surgeres, of la Tremblade, of the isles of Oleron and Re, especially the white grape called *la Folle-blanche** in the west of France the wine of which is unsavoury but very spirituous, yield the brandies so highly appreciated in commerce under the name of Cognac.

In Gard and Herault where brandy is made yearly in great quantities, they distil only red wines, and the quality is inferior, generally speaking, to that manufactured in the West, both in taste and smell, notwithstanding the incontestible superiority of the wine.

As yet the causes of this difference are not understood; whether owing to the grape, or the processes employed, or whether owing to

* It is most rife in Champagne, in the environs of Cognac, Jarnac, Rouillac, Ruffec, and Aigre.

the neighbourhood of the sea and the wrack used for manure. Another point on which there is little agreement, is the time at which the wine is fittest for distilling. Some insist that it should be a year old, others that it should be distilled immediately after the vintage, or at most two months, while many keep their wines till March or April. These variances are doubtless owing to the nature of the wines or the weather of the districts, and may be fairly regarded as nothing more than approximative data.

The only general rules are these; 1st, that weak wines should be put in distillation sooner than strong wines, because more apt to sour; 2nd, rich, racy wines, deep coloured though clear, should have time to settle, precipitate, and refine, or the brandy will not be as fine flavoured, and will be apt to take the burnt taste; 3rd, that the more perfect the fermentation, the richer the wine is of sugar, and the older it is, the better the brandy. These are the principles adhered to by vine-growers the most intelligent and successful in their brandies, and therefore merit some consideration.

CHAPTER II.

ECONOMICAL METHOD OF DISTILLATION.

The new machines invented for distilling are very costly, apt to get out of order, and are as much injured by being laid up as by being in use; of course they are only suitable for large establishments. The old are imperfect, but cheap; easily repaired, handled and stowed away; but they require a great deal of fuel, and much attendance, and therefore reduce the final profits by far too much. Between the disadvantages of these two, it is incumbent on small proprietors to make a choice, or else endeavour to obtain a modification of the evils of both, a desideratum which seems to have been discovered by Astier of Toulouse in his yearly experiments ever since 1808. He is a correspondent of the Linnean Society, and has modestly preserved an anonymous fame; but his services to chymistry and rural economy sway my feelings and make me consider it a duty to betray his name.

He thus expresses himself—

"The main point of the new apparatus consists in profiting of the difference between the degree of temperature which condenses water and that which condenses alcohol, by which the spirit is kept from alloy. This *Adam* has taken advantage of by his oval vases,* *Berard* by his cylinder, *Baglioni* by his cone. The same separation constantly takes place in any ordinary worm, but as the worm has but one beak, the phlegm and spirit afterwards unite, and thus united reach the cask. This is a fact of which I am certain; and I do insist that by one and the same distillation may be obtained apart from common wine, alcohol, Dutch proof-spirit, and simple brandy, all by rejecting the phlegm.

"As soon as the still is in operation, the steam from the capital, in the first turn of the worm is at a temperature of 80° or 100° Reaumur. Here, only water condenses; and the alcohol in vapour passes into the second turn, where it also condenses by the lower temperature. If the condensed liquid is drawn off from the upper turn it is mere phlegm or water; while that from the second turn is alcohol or spirit. So theory would incline us to believe, and I have found that it is ac-

* The vessels furthest off from the boiler, through which the worm passes; they are kept full of water during distillation and are called *condensers*.

tually the case by practice. Having so constructed a worm that I could draw off separately the products of each of the four turns, I obtained from a very weak Toulouse wine seven eighths Dutch proof spirit; the same wine by the old method gave only one eighth plain brandy. The intercepting of the product at each turn I effected in the following manner. Each turn was furnished with a very slender lateral pipe, about the thickness of a finger and ending in a faucet and tap. A crescent-shaped valve placed just before the opening of the pipe into the worm obliges the condensed liquid to trickle into the pipe, and a slight elbow above and below the pipe prevents any of the steam from running in the same direction. Each of these pipes follows the main-worm in all its convolutions, comes out of the condenser by the same opening; and is led thence, each to its own recipient. The pipe of the upper turn has also a second branch with faucet, which lets out the phlegm as soon as condensed, which is perfectly worthless. A prover indicates the moment when the feints should be separated, according as simple brandy or proof-spirit is wanted. These feints are either detained in the boiler or set aside for rectification, in all cases necessary for the last spirit which comes over, without which it is not worth the fire that raises it."

With this simple apparatus, every thing in proportion may be obtained, that is produced by the most complicated stills, that is to say, plain brandy, Dutch-proof and even thirty-five and thirty-six proof, but in small quantities.

Any one who has a worm of the old construction, may at a small expense adapt it for this method; nothing more is required than three or four small pipes arranged as already described, and holes made in the worm for the insertion of the pipes.

Besides producing more spirit, and saving three-fourths out of the feints, the worm thus furnished shortens the term of distillation by one half, and consequently there is that much of a saving in fuel. It took formerly ten hours to work a still, by this method it takes but five; so that, easily, and without night watching, the still may be set twice a day.

Finally, what is still better, by *Astier's* method, a sour wine may be distilled as well as any other, without (so I am assured by many correspondents, who have tried it) the least taint being perceptible in the brandy. Of course, the spirit is less in quantity, because the acidified proportion of the wine renders none; but whatever is obtained, is free from acerbity; and all the acid separates and flows out by the first pipe, which gives an opportunity of turning the acetous portion to profit.

CHAPTER III.

VARIOUS SORTS OF BRANDY.

In every district where the wine is valuable and the press is not forced, the grape-murk is distilled, as in the Marne vineyards, under the name of *Aixne brandy*, and elsewhere by the name of murk or pumice brandy.

The murk is taken from the wine-press, and after being stirred with wooden forks or shovels, is thrown into vats and slightly moistened with water. The vats are well covered down with a woollen cloth; and fermentation soon commences. So that the murk may be kept moist, though not soaking, a small quantity of soft water at the temperature of 12° or 15° of Reaumur is added daily; of the quantity habit must be the judge; as soon as the vinous character is perceptible the murk is ready for the still, and should be treated with a very slow fire.

This brandy is inferior, and it is very difficult to preserve it from the burnt taste. This latter evil may be prevented either by submitting the murk to a very heavy press, and distilling only the liquor; or by using the sand-bath, or by raising the pumice from the bottom of the boiler by a wicker frame. By these two latter methods pumice brandy is in no wise different from the spirit of wine; but the quantity is not as great as when distilled in actual contact with the fire.

Some vine-growers put the lees of wine to the still; this makes a still inferior sort; with a marked acid taste; and is more difficult to rectify than any other kind.

Almost all the spirits known in commerce by the name of Andaye brandies, are counterfeits. The real kind is direct from Andaye, (Lower Pyrennees) is renowned for its mildness and fennel odour, a flavour peculiar to the wine of those parts. It is imitated with old Cognac brandy, to every gallon of which one sixth of syrup is added, and one tenth distilled aniseed-water.

The *fenouillette* of the isle of Re is only common brandy distilled over fennel. A handful of bruised fennel is thrown into a boiler that holds 60 gallons, or in place of that a large bunch of the fennel itself gathered in flower.

CHAPTER IV.

*DIRECTIONS FOR ATTENDING THE STILL.**

Before pouring the wine into the boiler, it should be so thoroughly rinsed and washed that the last water comes off clean. A negligence in this point gives rise to two evils; the one, the formation of a crust of tartar, lees and extractive matter, which causes the ruin of the boiler, by preventing the immediate contact of the liquid on the metal and exposing it to the whole action of the fire; the other is to give, after the still has been several times used, a certain taint of burning to the brandy.

As soon as the boiler is clean, the wine is poured in generally filling it three fourths. A sufficient space must be allowed to prevent the froth of the boiling liquor from passing over into the worm. Distillers know by experience how full they may fill; they guage with slips of wood plunged perpendicularly into the boiler; knowing from practice the capacity of the boiler and the quantity of wine it can hold without inconvenience; but the surest method is to have a pipe with a tap at the proper height, and to leave it open when pouring in, and as soon as the pipe runs, no more should be poured. Another advantage of the pipe is to allow the internal air to escape as fast as expelled by the introduction of the wine, and, to enter, when water is poured in upon the drawing off of the refuse. *Chaptal* tells of a very large boiler that collapsed, and burst like thunder, by the pressure of the external air, as the assistants were pouring in cold water while it was still hot.

When the boiler is filled, the next object is to set it in operation; the first thing to be done is to station the vats or tubs for receiving the spirit, and the next to lute the capital to the boiler, and the worm to the capital. This must be done with care and attention, to prevent waste.

After the fire has been set, which must be slow and kept as much as

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* This chapter is a close abstract from Chaptal; I could have no better resource for such directions.

possible at the same grade, the air begins to rush out from the free extremity of the worm; and gradually, the rising steam warms the capital, and there trickles from the worm a weak, unsavoury brandy, which is caught and set aside to be re-distilled or rectified. The spirit which succeeds this, is the finest, and is called proof brandy; the quantity of it is increased by a careful attention to the regularity of the fire.

By tasting, trying, &c. it is discovered when this first brandy is followed by a weaker kind containing more water; the first is set aside, and the second quality is caught by the receiver. The further the distillation advances, the more water is contained in the product; finally it reaches that point that the distillation contains no longer any spirit; this is discovered by the taste, and by throwing a few drops of it on the capital, it turns into steam, which burns with a blue flame on the approach of a lighted candle if it contains spirit; if not, it will not kindle. In the latter case, the fire is immediately put out, and the refuse is drawn from the boiler.

The quantity of *proof brandy* is in ratio of the quality of the wine. In the department of Charente, for instance, a boiler containing 60 gallons gives from 23 to 28 quarts proof spirit; that is to say about one tenth of its bulk of proof brandy, and a little more, of second-proof. In Gard and Herault, from 60 gallons they obtain 12 quarts of proof brandy and the same proportion of second-proof. The second-proof brandy or *feint* as it is called, is rectified with a slow fire to obtain the alcohol; sometimes the feint is put in with the next portion of wine into the still.

Whatever the brandy is distilled from, whether from the wine, the murk, or the lees, it is put for preservation into casks; there it acts upon the wood and acquires a peculiar flavour according as the casks are of beech or oak, which is called the *smack of the staves*; it becomes also yellowish-tinted, which can only be prevented by keeping it in vessels of glass or metal, a mode too expensive or too hazardous in case of transportation.

Brandies put into new barrels draw the sap from the staves, and while they deepen in colour, lose a portion of their strength. To prevent disappointments on its arrival in distant places, if brandy of any particular rate of proof has been ordered, it will be necessary to soak the casks in bad brandy, or else put up a brandy of a proof a little higher than the order.

With the old still, all the brandies made for sale had a flavour of burning, almost inseparable. To this, northern consumers had become so accustomed, that for a long time after the new distilling ap-

paratus was introduced, the mild, smooth, sweet spirit had to be adulterated with empyreuma to obtain any sale. This flavour of burning, which in so many cases rendered white brandy unfit for the uses of rectified spirit, for instance in the making of cordials, was looked on as a sign of strength by the people of the North, whose rigidity of fibre requires a rough agent to excite its sensibility. And from the same cause, the spirits distilled from malt, acrid, empyreumatic and excoriating,are preferred to the spirits of wine in cold countries.

Before the new apparatus came into use, the higher rates of proof in spirits of wine were obtained by rectification or re-distilling. There were two modes; the one re-distilling in the same boiler, never allowing the heat to exceed 75° of Reaumur.

At that degree the spirit rises and the water is simply warmed; the spirits all escape through the worm in steam, and the water remains in the boiler; the highest proof comes first and the succeeding product constantly grows weaker and weaker. By collecting various rates of proof in due time, into different receivers and mixing them afterwards, any rate can be obtained; for instance, if the first that comes over is 36, the second 35½, and the third 35, you can have 35½ by mixing them all together.

The other process was to rectify with the Sand-bath, by the heat of boiling water, into which the boiler was plunged; by this means the brandy could never be struck by a degree of heat equal to the distillation of water; and this mode, the surest and safest, was therefore the one most preferred.

CHAPTER V.

USES OF THE MURK.

Press Wines.—After the crushing, the murk is still soaking with juice; which is obtained from the murk, by the wine-press, and is nearly as good as that which flows freely.

Pricked Wine, or Piquette.—The refuse of the vintage, consisting of grapes not quite ripe, must be crushed, and these with the murk from the wine-press, and the addition of a little water heated to 15° of Reaumur, and a few ounces of syrup, put to ferment, produce a low wine of tolerable strength; two or three handfulls of young peach leaves, a bunch of mignonette in bloom, and a little orris-root must be thrown into the vat, to give it a flavour and fragrance. It has a good face, though rather pale in colour; and is a delightful beverage to the mowers, when labouring in the fields under a hot sun.

This *piquette* is liable to sour immediately on exposure to the air; to make it less apt to turn, some add to it honey, which gives it a body. Others throw into the vat tartar or cream of tartar, which makes the fermentation stronger and the beverage more spirituous.

The best *piquette* or pricked wine, is made from the pumice of the white grape; that from the red grape is not so good. Eight or ten days is enough for the fermentation.

Gravelled Ashes.—The murk, after the piquette is drawn off, if burned affords potash in considerable quantities; from 3500 pounds of the murk, 500 pounds of ashes are obtained, and from these the yield is 110 pounds of potash.

Spirit of Wine-lees.—If warm water is added to the murk and the whole put into the still, a very fair brandy can, with proper precautions, be obtained, as I have already noted, under the head of *Various Sorts of Brandies.*

Verdigris.—This name is given to that oxyd of copper which is formed by the acetic acid of the murk. It is a very important and extensive object of manufacture, formerly limited to Montpelier, and which employs a great many hands in all the Vine-growing districts

The sheets of copper, cut to sizes fitting the vessels that are used, are covered with the murk, which is distributed layer by layer between every sheet of copper. Over the whole is poured some low or soured wine, or acid refuse from the still. As soon as the copper is sufficiently oxydized, it is rasped and put up in skins for exportation and trade.

Vinegar.—By a last and very strong pressure, a liquid is extracted from the murk which is a superior vinegar. To obtain it, the murk is first well aired and exposed until it sours.

Fodder of Grape Husks.—In general the grape husks are a fine nourishment for all herbivorous animals. Given dry, loose and mingled with other substances, the murk is a favorite food of cows, sheep and fowls; the latter, while they feed on it, lay frequently. It is given fresh in some places to cows and mules, but improperly; because, when eaten in a moist state it shortens the lives of those animals; they become inebriated and heated; the milk of the former sours quickly, and the latter grow weak and feeble.

Manure.—The murk makes a fine sort of manure, and does not, like all other manures, injure the quality of the wine. It is composted with pigeon dung by the following measures. Daily after the vintage large basket-fulls are scattered around the pigeon-house; the stones are greedily eaten by the birds, and they grow fat and multiply fast on this food. At the end of two months, it is raised, and transported to the hog-stye, and laid in a trench that runs the length of the pen and into which the sluices from the pen will drain; this trench is to be prepared for the murk, and coated at the bottom with a thick layer of soil from the stye. Into this trench also is collected the dung of geese, ducks and other fowls upon the farm. As the litter of hogs is of a cold and fat nature, and the dung of pigeons dry and heating, there results from these and the murk, a compost exactly suited for the vine. It is carried to the the vineyard in the month of February, if the weather is fine; day-laborers are employed to loosen and turn up a little of the earth around each stock; and women or children carrying baskets of this manure, throw in a little around each stock, and cover it over lightly with the earth. The next rains cause the vegetable salts of this compost to penetrate down to the roots; and the same season the crop bears witness to the good effects of this dressing.

Grape-seed oil.—Some make a business of washing out the grape-seeds from the murk with water, and drying the seeds, which, on grinding, yield an oil superior to nut-oil, and which is used in cooking, in tanning, and for lamps. This oil, on burning, emits a flame as brilliant as olive oil, and with scarcely any perceptible smoke or smell.

It is quite a new thing, even in Italy, where it was first employed. During my sojourn in the celebrated Peninsula, I saw simple presses, worked by a single hand, and of extraordinary strength which were used for this purpose. All my inquiries could discover no earlier date for it than 1759, about which time Grape-seed oil was extracted in Bergamo; in 1780 it was made at Rome and around Ancona; in 1818 at Naples, Castellamar and Resina. Since 1791, attempts have been made to fabricate it in several parts of France, even at Paris, which have perfectly succeeded. At Berne in 1781, and in several districts of Germany since 1787, the thing has been attempted; but nowhere on the great scale as in Italy. It does not with us cover the cost of fabrication, because olive-oil is so excellent and cheap, and the other oils of commerce so cheap and abundant, that no competition can hold out with them. The Italians beside extract nine per cent. of oil; a quantity never as yet obtained in France; exertions to that effect are now under way.

Fuel from the dried Murk. The most usual custom is to take the murk from the press, break it while still compact into large or small clods and stack it under a shed to dry: it is then burned in winter, like turf or tan.

Pumice baths. Finally, the healing art places the new murk in the list of strengthening articles in the Materia Medica, very active in rheumatic pains, old sprains, and weaknesses of the legs and loins in consequence of rickets. Its efficacy in consolidating cured fractures is also much boasted. It is thus employed: the diseased part is buried under a heap of the fresh murk, in a state of fermentation, under which it is to be kept for a longer or shorter period of time, according to circumstances. It excites very plentiful sweats, which give great ease and determine a prompt cure. This is the mode of application called *pumice baths;* it should rather be, *pumice cataplasms.*

BOOK FIFTH.

DOMESTIC USES OF THE VINE CROP.

The vine, the fruit, and the wine also, contribute to many uses, either of importance to commerce, or as additional resources to domestic economy. Of these I shall now treat, as a necessary complement to the preceding part of my labours. But I shall not make mention of any other than such recipes as I can warrant, or such uses as long experience has sanctioned.

CHAPTER I.

USES OF THE LEAVES AND THE SAP.

The Leaves.—The leaves of the vine are greedily devoured by all cattle, especially the cow, sheep and hog, which are excessively fond of them. They are a great resource during a dearth of fodder. But it should not be forgotten that the wood will not ripen without the leaves; and that they are a great protection against the frost; as well as an essential towards a mature and plentiful crop. They should not be plucked; but, as they fall, should be gathered, heaped in a dry place, or salted and packed hard in barrels. They may be packed alternately with straw or hay, which soaks the taste of the leaves and becomes a new delicacy to the cattle.

In some of the southern departments they actually admit the herds or flocks into the vine-yard itself, to browse, as soon as the vintage is over. At Alais and Anduse (Gard) they prune off the leaves as soon as the grapes are gathered; this method is preferable, as it preserves the stock, and keeps a leaf to the eye that is in want of shelter against next year.

Tears of the Vine.—Few plants are more abundant in sap than the vine at the moment of budding. It bleeds extravagantly for the slightest wound. The bleeding at the bud does the plant no harm; it is a needful evacuation; but the sap from a cut or wound at this season is often a fatal injury. To this very limpid liquor many healing properties are attributed in various country parts.

To collect it, an empty bottle must be buried in the ground, and a stem, the end of it cut, must be bent over, without breaking, and inserted into the neck of the bottle. In a few days the bottle will be filled.*

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* In Missouri it has been noticed that the tears of the native grape are an excellent substitute for *gum arabic*, and scarcely distinguishable from it, in taste or appearance.—*Translator.*

CHAPTER II.

DOMESTIC USES OF THE VINE.

To keep grapes fresh.—There are several ways practised of preserving the grape fresh for the use of the table; one is to leave it on the stock, first twisting the foot-stalk; to hang the bunches each in a paper bag; or suspend them in a clean airy room, or spread them out in a loft on straw. The sugar of very sweet grapes will preserve them dry in this condition for a time; but they soon mould, especially if they have not been slightly dried in a stove, or in the bread-oven, when no longer hot enough for baking; and they are certain to fail, unless they have been gathered while the sun was shining, and put up in a dry place, beyond the reach of the air or light.

But the following process is simple, and the success certain. Take a new cask, dry and strongly hooped; stand it in some spot where the temperature is always very nearly equal; cover the bottom of it with bran that has been well dried in the oven; and put into it the ripe, unblemished, perfect bunches, layer by layer, filling in with the bran, before another layer is laid down. When filled, the head must be fastened down air-tight. Grapes thus put up will keep so well, that 7 months after the vintage they will be unspecked, without mould or foreign flavour, even the greyish-white down upon them, the same as if fresh that moment from the vine. Kiln-dried spent-ashes are used by some instead of bran; or, as FRANKLIN recommends, very dry millet seed. It was his custom to keep grapes fresh in kegs lined with Chinese sheet lead, and filled compactly with millet-seed. The Spaniards use saw-dust, dried in the sun; and the casks are previously painted inside with pitch.

Boxes with rows of wires and hooks to keep the bunches suspended and separate, are used for this purpose, the joints plastered with mortar, and the boxes are then buried in dry ashes or fine sand; but grapes thus put up are nothing equal to those preserved in casks of bran. For my own part, I cannot say much in favour of the method above mentioned of spent-ashes sifted into the cask, instead of bran, although it is a successful one; before the grapes can be eaten they must be put in-

to water and shaken, or water poured on them to wash off the particles, and the crust here and there formed with the juice; and after all, some portions always remain, which is found extremely disagreeable in eating.

To dry Raisins.—This excellent mode of preserving a delicious fruit has been in use from time immemorial. The Grecians twisted the foot-stalk and left the bunch on the vine until it withered, when it was gathered and dried in the shade. Raisins, with them, formed quite a branch of commerce.

The small town of Roquevaire, (Bouches-du-Rhone,) having gained an established reputation by its raisins, I shall give the recipe there practised. The Calabrians prepare them well also, but far less successfully than the inhabitants of Roquevaire. In that small town they only dry white grapes. They select the largest, pulpiest kinds, with few stones, and thinly scattered on the bunch. These are culled dead-ripe. Every berry with the least speck of rot upon it is picked out and thrown away. A strong ley is then prepared from wood ashes, from 12° to 15° of strength for the salts of potash, ascertained by the aerometer. When on the point of boiling over, the bunches are plunged in and drawn out as soon as the berries are wrinkled. They are next put to drain; after which they are spread on hurdles or reed mats, and kept in the sunshine from sunrise to sunset; during the night they are sheltered under awnings. Ten fair days are enough to dry them; but if the weather is rainy it takes longer.

Roquevaire raisins are considered excellent; they have a slightly acidulous, agreeable taste. Calabrian raisins are blackish, which is a fault, but they are sweeter than those of Roquevaire. Spanish raisins are finer flavoured than either, but are generally prepared with too much negligence; they do not keep as well, and are mixed with very small dry berries. The sort of Syrian raisins called Damascus, and which have a gilded hue, are highly prized for their exquisite flavour and property of keeping without alteration for two seasons. The Corinth raisins and currants from Zante and Lipari, also enjoy great reputation; those of Lipari are often the worse for a little dirt or gravel; but those of Zante are unexceptionable. They are small, rich, with the flavour of violets and but a single seed. They are prepared from white and red grapes indiscriminately.

Any family may prepare its own raisins, from perfectly ripe, handsome grapes; but before exposing them to the heat of the stove or sun, they should, positively, be bleached in boiling ley. Many persons think boiling water sufficient; it is not; and the alcali of the ley, which has a great effect on fruits to the North, renders the skin tender. As it

does not penetrate into the fruit it does not injure the acid which is the charm of the dried grape, without which it is cloying and dull.

Grape Syrup or Sugar.—Parmentier has left us quite a complete treatise on this subject, which should be consulted by all desirous of making the most of *grape syrup*.

This liquor is made by taking from the vat, the must of dead-ripe white grapes; if these cannot be had, the juice of black grapes expressed on purpose; and depriving it of its acids by mixing with it chalk marble-dust, gypsum, or spent-ashes. If it is to be prepared as soon as expressed, it need not be sulphured, but stumming is indispensable to prevent fermentation, if there is to be a delay of only four and twenty hours. It must be sulphured two or three times, and each time be poured out to cool very quickly in shallow trays or dishes. This syrup does not always need clarifying; if it should, whites of eggs, (in proportion to the quantity,) must be whisked in the liquid before it is perfectly boiled. This syrup is an excellent resource to the farm-house.

In small vineyards, the wine of which is not very sugary, or when the grapes do not ripen as is desirable,this syrup, added to the vat, corrects that fault. When not boiled to so concentrated a strength, this syrup will, if put to ferment, make very pleasant cordial wines.

In domestic economy, it is an advantageous substitute for sugar; fine sweetmeats are made with it; the very best of marmalade, and very good brandy-fruits, &c.

Grape Cordial.—This I have tried myself for many years, and find that it is well worth the trouble of making. Take dead-ripe black grapes, pick them and bottle them; the vessels only half filled with the fruit, must then be filled with plain brandy, corked, and stood in the sun for a fortnight. After which they must be emptied into a new, high-glazed, clean tureen, and the fruit must be mashed with the hand. The whole is then to be squeezed through a thick cloth, which must be wetted beforehand with brandy. The liquor thus strained, is returned into the bottles, with the addition of a little cinnamon and some peach-stones, cracked, and thrown in, shells and all. The bottles are to be corked and stood in the sun another fortnight. The liquor must then be filtered through blotting paper; and is a delightful drink, very cordial and stomachic, and becomes the better the longer it is bottled.

CHAPTER III.

VARIOUS USES OF THE MUST.

Marmalade.—With the must, various excellent marmalades are made; that of Montpelier enjoys the highest name; it is made from white grapes, boiled in the must to a clear jelly and scented with citron and cedraty. The marmalade of L'Yonne and Loiret departments, though esteemed, is inferior to the former; it is a little more tart and mixed with stone and seed fruits.

The pears used for this purpose, are the *Cressane*, *Bergamot*, *the Jargonelle*, the *Virgouleuse*, the winter *Bon Chretien*, the *Russeting*, or other firm kinds. Quinces are thought the most suitable mixture in marmalades; apples and plums come next; and lastly pumpkins, the rinds of green mangoes and melons, and sugary roots, such as carrots, parsnips &c. These fruits must be selected very sound, cut small, and spread out on fair straw to mellow before used. Table fruit is not fit for marmalade; it is only fruit in an acerb state that suits; that which falls before ripening is put aside for this purpose. The fruit must be pared perfectly, and the seeds, stones, and hearts, cut out.

In the North and South both, two sorts of marmalade are prepared, simple and compound. That made at the South, does not require as much cooking as that at the North. It contains, all other things being equal, less water, tartar and extractive matter, and more sugar. Parmentier has described the two modes; and my reader will thank me for giving the very words of this amiable and excellent man whose whole life was devoted to useful pursuits, and the means of turning to advantage every article of rural economy.

"For the simple marmalade of the South, take 6 gallons of must; one half must be put in a preserving pan over a quick fire, and the other half be gradually added every time the liquid boils up; this boiling liquor must not be lost sight of for a moment, and the scum must be removed as fast as it rises; and it must be strained hot through a thick cloth. It must then be put back on the fire, and constantly stirred with a wooden spaddle until it is boiled to a jelly; this is found

by dropping a little on a dish, when, if it cools into a jelly, it has boiled sufficiently.

"As for the simple marmalade of the North, when the 6 gallons have been skimmed and are reduced by boiling to 4 gallons, the pan is taken from the fire and the liquor poured into stone pans, where it is left for 48 hours in a cool place. At the end of that time the surface is covered with crystals of salt of tartar, which must be removed with great caution with a skimmer; the separation of this quantity diminishes the too marked acidity of the preserve, and increases its sweetness. This process is highly necessary in the North, and according to the season the tartar is in greater or less quantities; but in the South, the presence of tartar is rather desirable to relieve the insipid sweetness of the sweetmeat, which is so great, that aromatics have to be used to give it a flavour. When skimmed of the tartar, the must is strained through a thin cloth, decanted and put back on the fire, where it must be stirred without ceasing. The must has become marmalade when it sets in a jelly, on being stood to cool.

Compound marmalade of the South. When the must has been boiled to one half, and been sufficiently skimmed, it must be strained; and the peeled and quartered fruits must be thrown into the pan; pour over them the liquor, which by the first boiling up, melts into the necessary fluidity for acting on the fruit, and softening it into a pulp; stir constantly, until the boiled fruit is mashed and incorporated, and the whole syrup is one homogeneous mass. Towards the last, the fire should be gradually moderated. To know when it is done, take about the size of a hazel-nut and drop it on a china dish; if it does not sink flat, and if no moisture escapes from it forming an areola around it, the jelly is done. If the fruit has, on account of the vintage ripening late, been previously stewed—before adding it, the must should have nearly reached its final consistence.

For the compound marmalade of the North: after the must has been thickened by boiling, and freed of its superabundant tartar, it is put back upon the fire with the fruits that are to be mixed with it, precisely regulating the whole in the way already mentioned for the compound marmalade of the South. But, as the fruit selected is sometimes so acid that the preserve could not be used without the addition of some sweetening, a little grape syrup is added, while boiling; the syrup of sweetmeats, or Southern marmalade. The housekeepers to the North, who have not at command these means, first clay the must, that is, neutralize it with powdered chalk; then boil it to a syrup, and afterwards add the fruit, and proceed with the reduction of the whole as before mentioned.

An excellent marmalade is made from clayed must and pears in the proportion of 100 or 120 pears to 4 gallons of sweet must, and 4 or 6 quinces; it is sweet and mellow, with a slight tartness that heightens its fragance and flavour. The Northern marmalades are, on the whole preferable to those of the South, in which the sugar and tartar are not in such relishing proportions. The conserve must be covered in pots from the air, and stood in a dry place. When it candies, a little must may be added to it, or the pots be stood in boiling water for several hours and the jelly well stirred.

Grape Butter; in place of adding fruits of various kinds to the boiling must; some only add a certain portion of must that has been evaporated and concentrated to thickness; the whole boiled to the consistence of jelly, is a very agreeable and healthy addition to the table in fall and winter. This preserve is poured into pots, with cinnamon and cloves, and put in the bread-oven to bake, before it is considered sufficiently prepared for keeping. Before serving it on the table it is slightly warmed and is eaten with buttered toast.

CHAPTER IV.

VARIOUS SORTS OF MADE-WINES.

This chapter will refer more particularly to the wines prepared in the domestic way, and to cordial wines. Vinegar and its compounds shall be treated of separately.

1. *Made Wines.*

Under this head we must not include the syrups prepared from the must, because they do not contain a drop of alcohol. These syrups are only used for sweetmeats, or cordials, or for vats that are filled with meagre fruit; or, as is practised in some parts of the Archipelago and Egypt, to make a delectable sherbet, that will keep in wooden vessels, if stored in a cellar, for some time.

By made-wine is understood a fermented table-drink, obtained from a mixture of concentrated must, brandy, and some spices or aromatic seeds. The preparation of these wines belongs to the housekeeper or her daughters.

The use of these drinks is very ancient; it passed from Asia to Greece; from that all over Europe; they are still in request in Italy, Spain, especially in the neighbourhood of San Lucar, and in some departments of France, mostly in the Bouches-du-Rhone. The following is the most general recipe.

Pick the ripest, finest, and most sweet smelling grapes of the Malvosie and the Muscat kinds, at the hottest time of day, to avoid the least humidity. Lay them on hurdles and transport them with great caution to the spot in which they are to be exposed to the sun. Here they must be left for 5 or 6 days; turned three times a day, and sheltered at night. The sixth day they are to be crushed in the vat. Of the must thus obtained, only the upper part is taken out for this purpose, the lower not being considered so exquisite and rich. This *cream* of the must is put in a copper boiler over a clear charcoal fire, or at least a fire without smoke, where it must boil until reduced to one third, being in the mean time carefully skimmed. It is then poured into new, or perfectly clean, wooden vessels, and when cold is transfer-

red to casks and bunged tightly. The wine it makes is of a pretty amber colour, rich, delicate, and should be racked and bottled promptly.

In some southern districts, as the liquid boils up, they throw in some aniseed and coriander; cinnamon; six apricot stones, shells and all, six peach-pits the same, and after it has stood forty-eight hours, it is strained through a wet cloth. It is then put away in vessels and stands the whole winter; when it is drawn off clear, strained through a jelly-bag and bottled.

The best made wines come from Corsica; in the commerce with the North they pass for Spanish and Canary wines; and when they have reached their highest point of activity, and have become real cordial wines, they are sold for old Cyprus, Tinto, Malaga, and Madeira wine of the first quality.

To make a wine that will ripen sooner, the liquid must be taken from the fire just as it is about to boil up, and poured into a cask and well bunged; it will be fit to drink in three months; and will then seem to possess all the properties it would have naturally had in the course of six or ten years. Claret wine 2 or 3 years old, treated in this manner, assumes in a few hours, the colour, taste, and properties it shows in ten or twelve years.

Cordial wine is that, the sugar of which is not entirely converted into alcohol. France produces a considerable number, of good quality, fit to compete with expensive imported wines of this kind. There are red and white; those rated best, are the white Muscats of Rivesaltes (Eastern Pyrennees,) which connoisseurs liken to the best Malvoisy; Frontignac and Lunel, (Herault); the red *Grenache* wine from the vineyards of Bagnyals, Cosperon, Rhodes, and Collioure (Eastern Pyrenees,) the keen zest of which rivals the Rota or even Cyprus wine; the white *Macabeo*, made at Saleeta, (same department,) and which somewhat favours Tokay; and the Muscats called *Picardan*, *Calabrian*, *Malaga* and *Madeira* imitations &c. which are prepared in several of the vinegrounds of the department of Herault.

These cordial wines would enjoy a still higher reputation, if it were not, that by a most blameworthy cupidity, botched wines of this sort, mended with drugs, are often offered in the market as genuine. They are adulterated with raisins, Socotrine aloes, cherries, raspberries, peaches, orris or galanga root, or pitch or other like substances, selected nowadays with peculiar audacity for the purposes of deception. The wines thus adulterated are not really unwholesome, but they have neither the tonic powers of the genuine, nor their fragrant aroma. As I will lend no encouragement to these fabrications, I shall give none of the recipes for imitating foreign cordial wines; but leave it to the vine-grower to discover among the flavours of the fruits

of his own soil, the clues to still more appetising mixtures; while he gives his best endeavours to the cultivation of the plant and the perfect manipulation of the wine-making process.

3. *Straw Wines.*

These are so called from the grapes being formerly spread for several months on straw, or hung on ropes of straw, before being stemmed and crushed. Straw wines are still prepared in several vineyards of the district of Colmar (Haut Rhin,); in the neighbourhood of Nancy, (de la Meurthe) and at l'Ermitage (de la Drome). As the modes of pressing are different, it may not be amiss to give a succint description of them.

In the department of Upper Rhine, straw wine is only made in very favorable seasons; the best and ripest bunches are selected from those varieties called *reitzende* or *refined*; they are hung upon poles across the beams; and are visited daily, to pick out rotten or specked berries. They are exposed to the currents of air until frost, when, they are covered to protect them from the cold. The grapes are stemmed in March and carried to the press. As the grape is half dry it affords but little must, which ferments slowly. The liquor is drawn off as soon as the fermentation subsides; and it is one tenth the quantity of what it would have been at the time of the vintage. It is extremely sweet and smooth, and must be clarified and bottled. This wine has no fault save a slight tang of tartness which disappear s as the wine mellows. When six or eight years old it is very neat and agreeable.

In the departments of Meurthe and those in the neighbourhood, the grapes are prepared the same way, but they are squeezed in December. In March the liquor is bottled, corked, waxed and stowed away in garret lofts. There it completes its fermentation and becomes sparkling like Champagne.

The Hermitage straw wine is of a golden colour, and has a flavour like the flavour of raisins. It does not begin to ferment until several months after it is put into the cask, and therefore, in speaking of its age, the first year is never counted. The fermentation sometimes lasts six years, and it is not until two or three years after, that it is ripe enough to please; but then it is reckoned one of the best cordial wines in the world. Very little is made of it, doubtless on account of the minute cares and many details requisite to fabricate it in perfection; and the difficulties besides, in the way of sale, of an article so necessary to be warranted, and costly in all cases.

4. *Sparkling Wines.*

It is only in the neighbourhood of Rheims and Epernay (Marne,) that the famous sparkling wines are produced. These wines are obtained by a skilful admixture of black and white grapes; the bunches selected are the ripest and soundest, and are cleansed from all withered, green, or rotten berries. They are crushed by a press, that screws thrice; the first pressure affords the must for the wine; the second, which gives higher coloured and more spirituous wine, is added in the proportion of one tenth or twelfth to the sparkling wine; and the product of the third pressure is used to add strength to the common red wines of the country. Sparkling wine is bottled in the month of March after the vintage; the ebullition commences two months after; it is very strong in June, during the flowering of the Vine, and also in August when the grape begins to ripen; at which time the vine-grower meets with great losses from the breaking of bottles. This ferment grows feeble in autumn, and the next season it causes fewer accidents.

There are two kinds of this wine, the *sparkling* and the *still*. The sparkling is made in those seasons when the grape is not as perfect as possible, in seasons when the wines are apt to be light, tart, and not spirituous; but the *still* is made from the crops of seasons which were warm and regular, and in which the grape had come to perfection. The sparkling often lose their sweetness and fire in growing old, but become the livelier, the carbonic acid gas being constantly on the increase.

5. *Rose Wine.*

The grapes in the department of Marne, intended for rose wine, are culled and gathered with the same precautions as those for the sparkling wine; they are also crushed in the press; before being put to the press, they are stemmed and slightly bruised in vessels for this purpose, and left until incipient fermentation, by which the colouring matter begins to give a rosy tinge to the must.

This is the usual method; but some make use of a mixture called from the place of its manufacture, *Vin de Fimes, Fimes wine*. It is made from elder berries boiled with cream of tartar, and filtrated. A few drops of this liquor will give the colour; it is of a finer hue and keeps

longer than that obtained by fermentation; and it is thought that it does not in any degree impair the taste or wholesomeness of the wine. Nevertheless, I cannot second the use of it with my recommendation, as I do not believe that any adulteration or imitation can equal native excellence.

6. *Rape Wine.*

Rape wine is manufactured in the neighbourhood of Orleans and in several other departments from stemmed grapes to which feints are added, or from grapes laid in layers with Vine sprouts, or by macerating Vine sprouts in the must. It is boiled afterwards, and the liquor thus obtained is used to colour the low wines of cold and wet places, or to give them strength.

CHAPTER II.

OF VINEGAR.

The last article of produce from the grape is the acetic acid, or vinegar, the most general and useful of acids. The characteristics of vinegar are its peculiar odour, sharp without acrimony; a sour taste neither pungent nor disagreeable; a winy colour paler than any red wine; and a rate of concentration usually from four to six degrees.

Beside the constant tendency of wine to sour, there are modes and means of hurrying or promoting its acid fermentation. One way is to macerate in the wine, Vine shoots, stems of the bunch, green grapes, &c. but this foreign leaven is not enough, without the contact of the open air, and a temperature of from 18 to 20 degrees; the wine too should abound in alcohol and not be deep coloured. It should at least be a year old also, and never have been stummed. But these remarks only apply to the making of the choicest vinegar; for all deteriorated and injured wines, not reclaimable for other purposes, are properly set aside for vinegar; still the violent ferments that have previously injured their qualities, continue to show their effects, when the liquor is converted into vinegar. The taste, smell, and strength are inferior. The recipes of the vinegar-merchant indicate the necessary steps for bringing this acid to its highest degree of strength; and the whole principles of the art may be found fully developed in the tenth volume of the first edition of the *Cours Complet d'agriculture* of *Rozier*. But as I only write for vine-dressers, heads of families, and the rural mansion, I need only give the directions necessary for making vinegar as a household preparation.

Domestic Vinegar.—Have a barrel expressly for this use; and prepare it with the *mother* as it is called, to communicate a high degree of acidity. To this effect pour in several quarts of boiling vinegar, which allow to remain in the unbunged cask for seven or eight days; the barrel should stand where the temperature is mild and equal. Draw this off, and pour in the soaring wine, and leave the bung open

When it has become vinegar, and needs clarifying, take out a few gallons, into which pour a tumbler of boiling milk and shake strongly; let it stand till it settles, and the result is a straw-coloured vinegar, with the fragrance perfect, which would have been lost by distillation.

Distilled vinegar is white and very sharp, but retains an odour of burning for a long while; this inconvenience is only to be obviated by distilling in the sand-bath; or if the still is heated by boiling water which has been thickened by a strong solution of muriate or nitrate of lime, which raises the heat above that of boiling water, the distillation is easily effected in a perfect manner.

Aromatic Vinegar.—For this, white vinegar is necessary; lavender, thyme, or rosemary nips, or tarragon sprigs, are picked fresh, and spread before a hot fire to give them a quick and sudden drying, just enough to deprive them of any excess of moisure. They are then to be shred fine into the vinegar; which, when it seems strongly imbued with the requisite flavour, must be strained clear to prevent its growing mouldy, or changing in its colour and properties from the presence of foreign substances.

The above are the aromatic flavours most in request; however, use is also made of citron, raspberry, roses, elder-flowers, &c. The manner in which it is done is the same as for the tarragon, &c.

Sallad Vinegar.—The recipe for this Compound Vinegar is due to *Parmentier*. It is highly agreeable and tonic.

Take tarragon, summer savory, cives, shallots, and garlic, of each 3 ounces; mint-tops and blossomed balm, each a handful; dry the whole and shred the articles into a two-gallon demijohn, which fill with vinegar and leave a fortnight infusing in the sun; then decant the vinegar, strain and squeeze through a jelly bag, and filtrate and bottle it; the bottles must be well corked.

Vinegar Syrup.—This is a very healthy and agreeable summer beverage.

Fill a gallon of vinegar with as many clean picked, ripe raspberries as will take up the liquor. Let it stand a week; then pour the whole out into a silk sieve, and let it run through without squeezing. To every pound of this liquor put two pounds of loaf-sugar, broken small, and put the vinegar and liquor in a close alembic in the sand-bath, over a very moderate fire; as soon as the sugar is melted, put out the fire; when the syrup is nearly cold, bottle it, cork it well and set it in a cool place.

BOOK SIXTH AND LAST.

BRIEF HINTS ON THE DISEASES INCIDENTAL TO THE VINE-DRESSER.

In general, our vine-dressers toil laboriously and fare poorly; and if excessive exertion occasions diseases, bad nourishment weakens and deranges the vital functions. Undoubtedly the necessity of doing with promptitude the labours requisite about the Vine, is the reason why such extraordinary and zealous activity is indispensable in the labourer; but if amid this driving of work, poverty or what is worse, cupidity, refuses to afford the necessary and nourishing aliments, serious and complicated debilities are the consequence. The labouring countryman requires healthy food: he requires four meals a day, and five during the vintage, but these should be frugal. Frugality sustains and strengthens the native powers of the digestive organs, and bestows a robustness of health, to which toil seems light, and rest after fatigue a luxury. I have seen men, who had lived the greater part of their lives on no other nourishment during the better half of the year than bread, cheese and water, able to work with an unremitting ardour, and retaining their strength at an age which the inhabitant of cities rarely reaches without being overwhelmed with infirmities. The activity of the digestive organs in the rustic labourer is a proof of the justness of the remark of *Tissot*, that we are supported not by what is eaten, but by what is assimilated.

Cleanliness in clothing and salubrious dwellings are points of great importance to the vine-dresser; the looseness and size of his vestments is all extremely proper, but the vine-dresser is too frequently incautious in not resuming them when he rests from his exertions. By this want of foresight inflammatory diseases are very frequent;

inflammations of the joints, acute rheumatisms, dysentery, and intermittent fevers.

One essentially dangerous vice is, the habit of drinking wine or brandy to excess, which is here and there to be seen among the vine-dressers. These excesses sharpen and render inflammatory the diseases that befal the young, and cause incurable dropsies in the old. It is far from my thoughts to forbid that wine to the labourer which he has toiled so hard to produce with the sweat of his brows; wine is necessary to the labouring man to support his strength; but it is the abuse against which I speak; it is so hard a sight to behold the useful man dishonoured and degraded, and reduced to the level of the dangerous and burthensome sluggard.

But these are general considerations; let us look more closely to those diseases inherent in the condition of the vine-dresser.

In nearly every operation about the Vine, the labourer must keep himself bent double, which causes such pains in the back, as with the alternatives of heat, and cold, and wet, disposes him, with age, to remain bowed, or round-shouldered; I have seen very aged labourers whose backs seemed bent at right angles, but they walked very well with a stick. This may be prevented by the distribution of labour, and the use of bathing; but the vine-dresser too often prefers to do as his fathers have done before him, and to march off to the tavern from the vineyard, rather than to take care of himself. These pains in the back can be relieved by frictions of camomile, olive, or nut oil, with one twelfth part of volatile alcali; a woollen girdle or sash, also, should be worn next the skin.

The vine-dresser feels no inconvenience from the spring sun, but in the summer, the heat upon the head sometimes induces violent pains, turgidness of the bloodvessels, vertigo, bilious vomiting &c. When the evil is violent enough to call for prompt remedies, the physician should be sent for; and in the mean time the patient should be kept remote from the light and from noise; water, acidulated with vinegar, given him to drink; his feet should be soaked in very warm water saturated with salt or mustard, and emollient enemas be administered.

There is no labourer more subject to hernias than the vine-dresser. From the moment of attack every precaution is necessary, if he wishes to feel able to continue devoted to his usual tasks, or even to any of the slightest severity.

A silly notion of economy too often leads the sufferer to look to some tailor or seamstress for a bandage; but the use of a regular truss applied by a physician of judgement and experience, is the only course

to be pursued, if he would act with justice to himself or family. A false bandage, instead of being the means of sure and easy compression, is useless and embarrassing, and fitter to increase the evil than diminish it.

During the first ferment of the wine enclosed in the vat, or even when it is in the cask in small cellars, that have no draught, and are very low, vapours are disengaged, which are inebriating, and occasion vertigo, vomiting, numbness of the limbs, and overpowering stupor. These symptoms are not dangerous; rest and the open air, and drinks of hot coffee or acidulated water are sufficient to restore the individual to health; but too long an exposure to the carbonic acid gas renders the numbness dangerous, and asphyxia and sudden death are near at hand. It is better that these accidents should be prevented by foresight, than to trust to curative means to rescue the victims. Before entering a cellar, endeavour to discover by the smell whether the mephitic gas pervades it; if, on slightly opening the door, the peculiar odour is perceived, throw it open and leave the spot immediately, to give a chance to the expansive gas to escape from the confined precincts. If the smell does not satisfy you, open cautiously and look steadily into the cellar; if you perceive a mist in it hovering, and about to rise above the vat or casks, do not enter, but use means to disturb the air in the cellar, and if possible establish a draught. If neither of these directions give satisfactory results, if the presence of the mephitic air is suspected, notwithstanding appearances to the contrary, then drop a lighted candle by a string into the cellar, over some vat or cask. If the flame grows yellow, faint, and expires, the air of the place is dangerous to life, and must be renewed.

When asphyxia has taken place, the assistance should be immediate and persevering, but not hurried or careless. The first thing is to bring the unfortunate individual into the fresh air; after which, every part of the dress that might obstruct respiration must be loosened, and not a ligature or tightness of any sort be allowed around the body or limbs. Cold water and vinegar must be sprinkled, or dashed, over the face and skin, and light frictions be applied to the chest. If these means seem unavailing, the lungs must be inflated, either by an apparatus, or by some bystander breathing into the mouth of the patient, and then pressing the hand lightly on the chest and abdomen, to re-establish the mechanical operation of respiration in the lungs; purgative enemas should next be tried, blisters be put on, or even leeches applied in various parts of the body. Such exertions as these must not be discontinued for several hours; the least negligence or impatience may accelerate death, while these

humane efforts, steadily persisted in, are very seldom ineffectual.

I shall say nothing of such diseases as the vine-dresser is liable to, in common with every cultivator of the soil; nor those which may afflict him in common with every human being. My sole purpose has been to give a few hints of advice that may be useful, happy if my task has been fulfilled in a manner to satisfy the reader and to evince the sincerity of my wishes to see my country prosperous in agricultural arts, those nurseries of health, and happiness; whose influence is so closely united with the duration and final destinies of a nation.

THE END.

EXPLANATION

OF THE

PLATE.

FIGURE 1. *VINE-SHEARS.*

These shears were invented by M. de Molleville, and have received such improvements through the late *Edme Regnier*, that the pruning-hook, not one of the disadvantages of which belong to the shears, is now entirely supplanted by them.

The instrument, on the principle of a pair of nippers or pincers, is composed of two handles, *a a*, one of which terminates at top in a curved or hooked slope *b*, and the other in a cutting blade of tempered steel. By means of the double steel spring, *d d*, the branches of the shears are kept open; to assist in closing them, a loop, passed through a hole in the end of the handle, is jerked by the hand of the operator.

A. The instrument closed.

B. The same open; by closing the branches *a a*, the blade *c*, cuts through the wood, shoot, or stem, against the slope *b*, with the cleanness and certainty of a sharp knife, without giving any shock to the plant. It sells at the price of five francs, ($1,) and is to be had in all directions.

FIGURE II. *QUENTIN DURAND'S GIRDLER.*

With this instrument girdling can be performed without danger to the plant, and with certainty of neatness and precision; also with the saving of half the time.

A. The instrument in front.

B. A side view.

It has steel blades, *a*; two cutting edges, crescent-shaped; a guard to prevent the edges from cutting too deep: and springs to regu-

late the force applied to the handles. The dotted lines *b* show the circuit from left to right made by the instrument during the operation of girdling.

Figure III. *BETTINGER'S CUTTING NIPPERS.*

Bettinger's utensil deserves to be preferred to all others for safety and expedition in girdling. The inventor is a lock-smith in Paris, Rue du Faubourg-du-Temple, No. 94.

A. shows it in front, B. in profile. The several parts are *a*, the handles; *b*, spring to keep them open; *c*, four steel edges; *d*, screws to fasten the edges. From the shape of these edges, which are set free in the prongs or nippers of the instrument, and are screwed across an opening, there is a passage above and below them, as they work, by which the bark and skin is carried off. The edges, as they are mounted, do not project further in face of the prongs than is necessary for cutting the bark without hurting the wood.

Figure IV. *MACHINE FOR CRUSHING THE GRAPES.*

The idea of this machine originated with M. Acher, of Chartres; but has been brought to its present perfection by the author of this treatise. Not the smallest berry can escape its action which reduces them to pumice with celerity, exactitude, and neatness.

It is composed of a wooden frame-work, to the upper part of which a hopper, *a*, is attached, into which the grapes are thrown. From this, the berries pass under a cylinder, *b*, which is turned by an iron handle, *c*; the cylinder is garnished with nail heads which scrape, as the cylinder revolves, against the teeth of an iron comb, *d*, which is firmly suspended from the hopper *a*, by two screwed hinges, *e*.

The cylinder *b*, should be a foot in diameter and three and a half long. The nail-heads must be driven into it in bias or slant-wise lines; the spindle of it should be iron, and for the convenience of the workman, should have a turned wooden handle *k*, over the iron spindle. The spindle is slung at both ends, into a notch *l*; and the back of the hopper, and a portion of the sides of it, are carried down, beyond the cylinder, in such a manner as to form a projecting, broad, open gutter or slide, down which pours the bruised pumice into such vessels as are stationed to receive it.

The teeth of the comb are perpendicular to the spindle of the cylinder, and the use of this comb is to clean from the nail-heads, all obstructions that might clog them.

Figure V. *THE CRUSHING MACHINE OF M. GUERIN.*

A. The machine seen from above; B, a perpendicular section of the same. There are two rollers *a a*, which, by pressure and rubbing mash the fruit. They are put in motion by two toothed wheels *b b* of different sizes, which causes one of the rollers to move more rapidly than the other. Each wheel is attached to its roller by the spindle; the handle belongs to the smallest wheel. The largest wheel is ten inches broad; the smaller is only six and a half inches in diameter.

These cylinders lie along the bottom of a hopper, *c*, into which the stemmed grapes are thrown, and open upon a trough, *d*, below, that is five feet nine inches in length.

Figure VI. *INSTRUMENT FOR FILLING CASKS.*

The inventor of this instrument is M. Horpin of Metz; it is calculated for the purpose of preventing the spoiled wine on the surface from mixing with the rest in the cask. The long tube of this funnel is plunged in at the bung-hole to a considerable depth, and new wine is poured through it without disturbing the cask, and the spoiled wine is led off at the same time without any commotion.

This funnel has a wide mouth and a long vertical tube, *a*, through which the wine is poured; and a jointed tube *b*, through which the layer of spoiled wine escapes. Both these tubes pass through a bung of a conical shape, *c*, made of tin, and which is wrapped with linen, to fit it to the bung-hole for the operation; *d*, is a handle of iron wire fastened to a cork *e*, which closes the lower orifice of the funnel.

It can be made of tin; the tube *a* should be from 15 to 18 inches long; and four inches broad across the mouth; in the centre it should be 8 lines broad, and the lower opening should be two lines in breadth. The tube *b* should be four lines broad, and from 3 to 4 inches long. The false bung is made solid on all sides, is three inches broad above, an inch and a half below, and the same in thickness. The wire *d*, must

pass through the cork, and be fastened above and below with screw-taps; or instead of the cork, may be used a valve of varnished silk, opening from above, downwards.

FUNNEL.

FIGURE VII. *JULLIEN'S SYPHON.*

The use of this is for the transferring of wine from one bottle to another. The syphon *a*, is introduced into the bottle to be drawn off, up to the conical cork *b*, which must close the neck perfectly, and allow the end of the syphon *c*, to touch the upper side of the bulge of the bottle. This syphon terminates outwardly in a beak *d*, and is opened and closed at will by the faucet or screw *e*. The wine enters the syphon by small holes made in *g* near the cork *b*. A small horn or hook *h*, is soldered to the beak of the syphon to receive the loop of wire *j*, by which the small funnel *k* is fastened to the syphon. The screw *i*, should be open when the syphon is introduced into the bottle.

A. The syphon.

B. The funnel. The neck of the syphon fits to the mouth *l*, of the funnel; and is fastened by the wire-loop *j*, to the small horn *h* of the syphon. The extremity *m* of the funnel is curved so as to lead the wine against the side of the bottle. The funnel must be made fast before the operation is begun, and should not be moved until the drawing off is over.

Fig 1

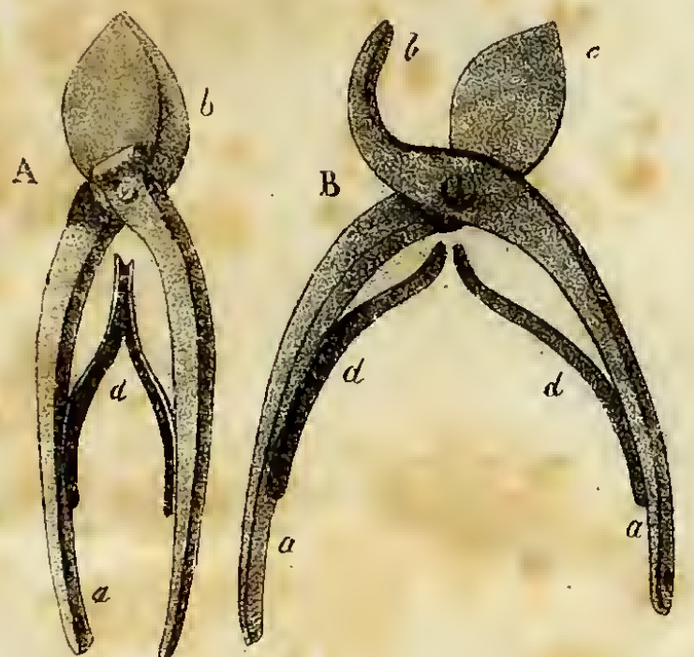


Fig. 3

Fig. 2

Fig. 4

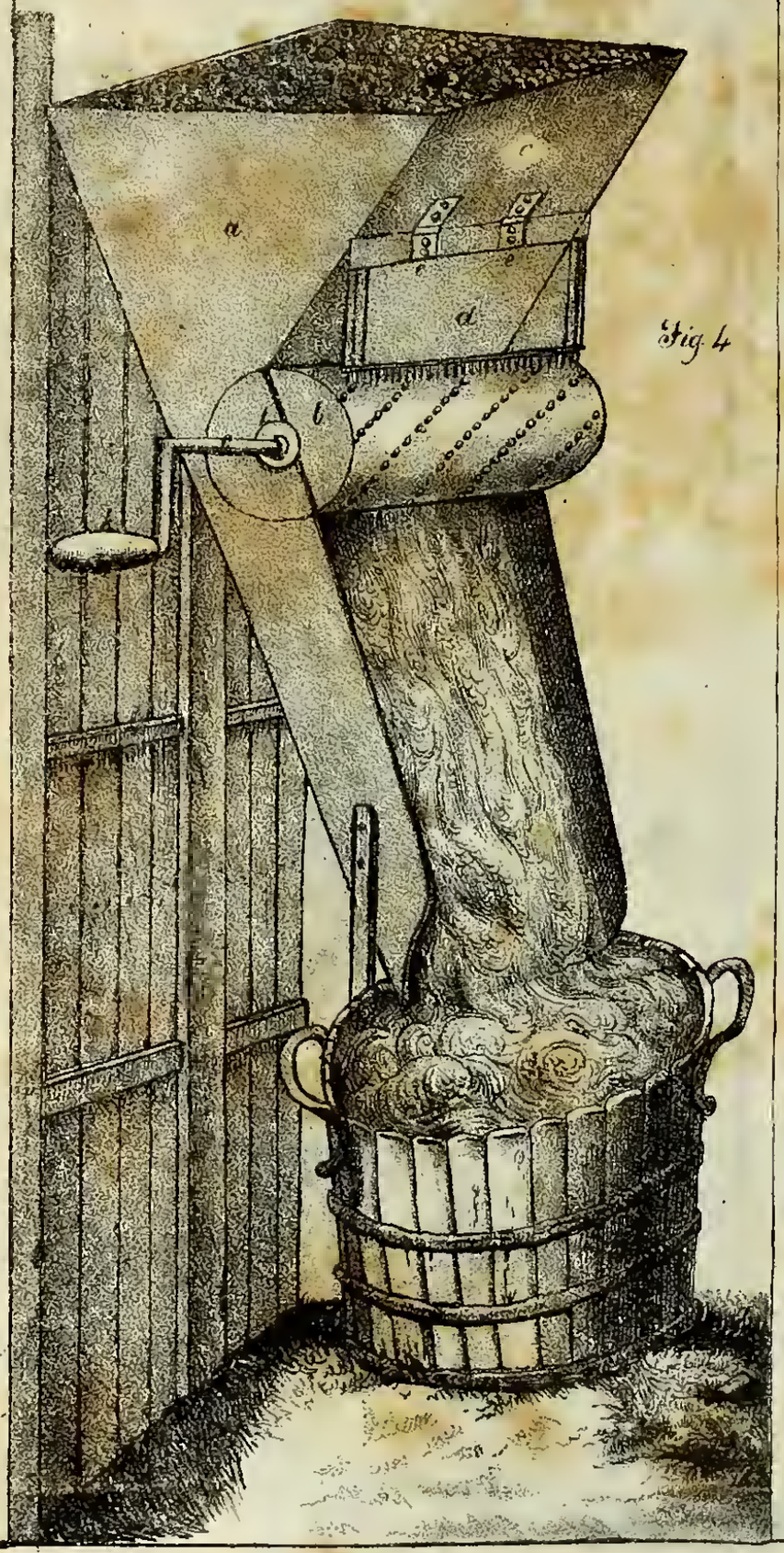
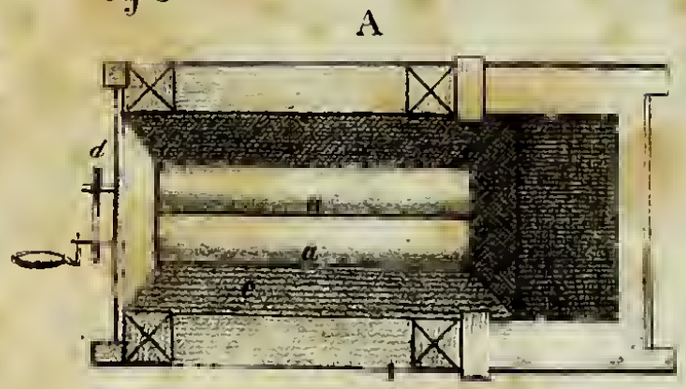


Fig 5



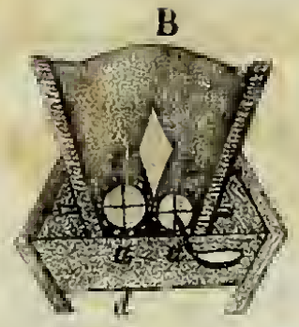


Fig. 6

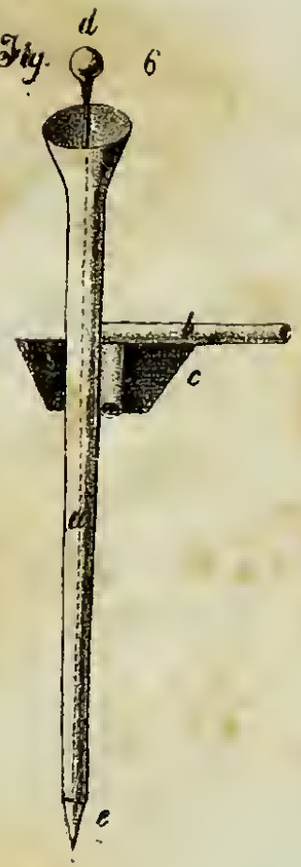
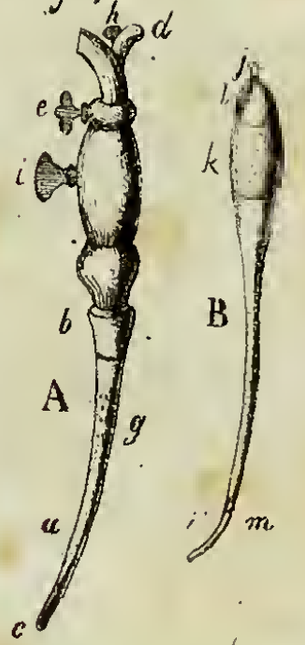


Fig. 7



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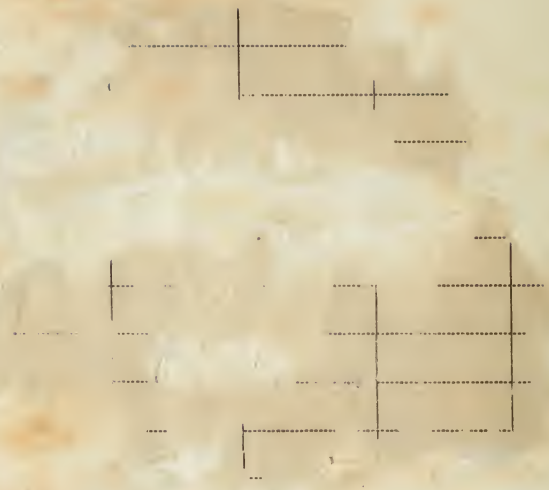
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